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Arts and Sciences:

CONTAINING

REPORTS OF ALL NEW PATENTS,

WITH A

DESCRIPTION OF THEIR RESPECTIVE PRINCIPLES AND PROPERTIES;

ALSO

Original Communications

ON SUBJECTS CONNECTED WITH

SCIENCE AND PHILOSOPHY;

PARTICULARLY SUCH AS EMBRACE THE MOST RECENT

INVENTIONS AND DISCOVERIES

IN

PRACTICAL MECHANICS.

BY W. NEWTON.

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LIST OF PLATES IN VOL. VII.

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No. XXXVII.

Recent Patents.

To Jacob Perkins, *of Fleet Street, in the City of London, Engineer, (in consequence of Communications made to him by a certain Foreigner residing abroad, and discoveries by himself) for the Invention of certain Improvements in Steam Engines.*

[Sealed 6th June, 1823.]

These improvements are divided into five distinct subjects; the first of which is an improved rotatory-valve; the second a novel construction of throttle-valve; the third, a new application of a loaded valve; the fourth, a new arrangement of rings for metallic stuffing, and the fifth, a new condensing apparatus.

The object of the first mentioned improvement is to reduce that friction in a rotatory-valve of the ordinary construction which is caused by the action of the steam on the upper surface of the revolving plate. This is effected by substitut-

ing a revolving-plug for the plate, and opening the upper part of the plug to the atmosphere. In Plate I. fig. 1, is a horizontal view of the lower plate of the rotatory-valve, which is fixed, the passage *a*, being for the induction, and the passage *b*, for the eduction; *c* and *d*, are the openings leading into and out of the cylinder. Fig. 2, is a section of the improved valve, shewing the revolving-plug *e e*. Round this plug is a novel kind of metallic packing *f f*, consisting of rings, upon the plan to be hereafter described under the fourth improvement. These rings are pressed up to the top of the cavity, in which they act by small spiral springs, and are kept in contact with the sides by their own lateral pressure; thus the revolving-plug *e e*, is rendered steam-tight.

The rotatory motion of the plug is to be produced by means of a toothed-wheel upon its shaft taking into a suitable geer connected with the moving parts of the engine. The steam (in whatever way generated) passes by the channel *a*, of the fixed plate into the circular space *h h*, which circumscribes the plug; from thence it proceeds through several small holes into a channel *i*, which extends in a circular direction nearly half round within the plug; from this channel the steam passes down through the opening *c*, into the cylinder, and having there by its elasticity projected the piston forward, escapes from the cylinder through the opening *d*, into a channel *k*, which is also formed nearly half round the plug, as *i*. From this channel *k*, the steam passes through holes into the central space *g*, and thence through the eduction-passage *b*, to the condenser. Thus by the rotatory motion of the plug, the induction and eduction passages are alternately opened and closed. One of the principal advantages of this plug is, that by its peculiar construction the steam, which in the revolving plates now in use presses wholely on the upper surface, and thus creates an increased friction according to the force of the steam, is allowed

in the improved valve to pass from the induction-pipe round the outside of the plug filling the space *h h*. By this arrangement it will be seen that the steam from the eduction which occupies the channel *k*, and the central space *g*, will press the plug upwards; while the steam that is proceeding by the induction passages, will in the circular space *h h*, press the plug downwards, and thereby counteract or neutralise the excess of friction which would otherwise be created by an increase of force in the steam.

The second improvement (viz.) a new construction of valve to serve as a throttle-valve, consists in a method of opening and closing the steam-passage by means of the elasticity of a metallic plate or disk acted upon by a governor. Fig. 3, is a section of this valve; *a*, is a screw intended to be raised and depressed by the governor, which screw works in the plug *b b*. The bottom of this plug *b*, is made slightly concave in order to allow a thin flexible disk of steel *c c*, to lie in it:—*d*, is thep assage by which the steam proceeds from the boiler or generator, and *e e*, is a circular recess in the seat of the valve. The steam proceeding from the passage *d*, enters the recess *e*, and from thence passes through the passage *f*, to the working cylinder. But when the action of the engine is too rapid, the descent of the screw-plug *b*, (which rises or falls according to the velocity of the governor) will press the flexible disk *c*, down upon the aperture of the steam passage *a*, and partially, if not entirely, closes it.

The third improvement, a new application of a loaded valve, is shewn at fig. 4, in which *a*, represents part of a generator with its loaded valve, as described in Mr. Perkins's patent of December, 1822, (see Vol. VI. page 1.) *b b*, is the pipe extending from the generator to the working cylinder *c*. The passage of this pipe is intercepted by the improved valve at *d*. The construction of the passages are sufficiently shewn by the sectional part of the figure:—*e* is

the slide-rod forced upwards by the loaded lever *f*; this rod must slide free in its tube, and allow water to pass between; the steam above pressing upon the water forces it down, and thereby closes a conical leather valve, which is made to encompass the lower part of the rod, and thus the valve is kept steam-tight, the length of the tube keeping the water at bottom so cool as not to injure the leather. By this arrangement the steam evolved from the generator must, before it can pass into the cylinder, force down the sliding-rod which forms the loaded valve. This resistance or interruption of the steam, previous to its entering the working cylinder, is the substance of the improvement proposed under the third head. It is stated that it will be proper here to observe "that the application of a loaded valve interposed between the steam-chamber of an ordinary steam-boiler and the cylinder, will answer the same purpose; the third improvement therefore does not embrace any novelty that may be in the particular loaded valve shewn in the drawing."

The fourth improvement (viz.) a new arrangement of rings for a metallic packing, consists of an elastic ring between two non-elastic rings, the opening of the first being covered by the solid parts of the second, the passage of the steam being thereby effectually intercepted. Fig. 5, is a section of the piston with the improved metallic packing, and fig. 6. is an external view of the same; *a*, is an elastic ring, such as is commonly used for this purpose, the plan or horizontal view of which is shewn at fig. 7; it is cut open at the part marked *b*. In order to prevent the escape of steam at the opening two non-elastic rings *c c*, (shewn also in the horizontal view fig. 8,) are placed, one above, the other below the elastic ring *a*, and are kept in their positions by guide-pins *e*, extending from the solid piston, and are pressed to that side of the piston where the elastic ring is opened by

springs. The effect of this contrivance is, that the elastic ring *a*, filling the circumference of the cylinder in which it works, prevents the passage of the steam except at the open part *b*; the excentricity however of the solid rings *c c*, is contrived, so that when the piston is put into the cylinder they lay close and cover the opening of the elastic ring, thereby rende ring the whole a perfectly steam-tight packing. Reversing the parts would produce a stuffing suited for a piston-rod.

The fifth improvement, a new condensing apparatus, is shewn at fig 9:—*a*, is a generator with its loaded valve, as before-mentioned: *b*, is an induction-pipe leading from the generator to the cylinder *c*.—*d*, is an eduction-pipe, which passes through the tube *e*, and thence into a reservoir *f*; this reservoir feeds the forcing-pump *g*, and by means of which the water is forced through the pipe *h*, into the tube *e*, and thence through the pipe *i*, into the generator. With this apparatus the operation of condensing is performed in the following manner.—

The steam from the generator *a*, passes by the induction-pipe *b*, into the cylinder *c*, at a very high temperature, and having exerted its power upon the piston leaves the cylinder at nearly the same temperature by the eduction-pipe *d*; while the steam is passing through that part of the pipe which is circumscribed by the tube *e*, cold water from the reservoir *f*, is pumped through the tube in a contrary direction, by means of the forcing-pump *g*, the effect of which will be that the steam in the eduction-pipe *d*, will be condensed, and will run in the form of water into the reservoir *f*, while the cold water by passing through the tube *e*, becomes heated, and in that state proceeds out of the tube by the pipe *i*, into the generator.

The points claimed under this patent are a "rotatory valve improved as aforesaid, and also a valve to serve as a

throttle-valve on the principles aforesaid; and also the said new application of a loaded-valve, constituting an apparatus for the purpose of creating pressure on the steam generated for the purpose of engines, which pressure must be overcome by such steam itself before such steam can act upon the cylinder or reach the piston; and also an arrangement of rings for metallic stuffing on the principle aforesaid; and also a condensing apparatus on the principle aforesaid."

[*Inrolled December,* 1823.]

We have now reported the last of the three specifications which embrace Mr. Perkins's improvements on steam-engines; from these his principles of operating may be fully understood. The details of a working engine embodying these plans, must necessarily combine many parts and contrivances common to other engines, from which cause we presume Mr. P. has not thought proper to give the plans and description of his engine entire. The experiments about to be performed, which we mentioned in our former volume, have not yet been submitted to public observation, but we are informed by parties who have been negociating a beneficial interest in these patents, that *they are now fully satisfied the plans possess all the advantages proposed.* We beg to observe that we at present have no experimental knowledge of these facts, and speak from the report of those whom we have reason to suppose must have had strong inducements to look cautiously at the subject. As soon as Mr. Perkins permits his experiments to meet the public eye, we shall present our readers with the results, and most probably accompany them with a representation of the engine complete.—Editor.

To Augustus Applegath, *of Duke-street, Stamford-street, Blackfriars' Road, in the County of Surrey, Printer, for certain Improvements in Printing Machines.*

[Sealed 18th February, 1823.]

The improvements claimed in this patent are embraced under five heads, the first of which applies to such printing machines as are provided with flat surfaces or tables for spreading the ink, and consists in passing the distributing rollers diagonally, instead of directly across the ink-table, by which the more regular and uniform distribution of the ink is effected: the second is in making the ink-table, or distributing surface, flexible: the third is a mode of inking the form of types, by means of a system of rollers, connected to endless bands or chains: the fourth consists in the employment of a cylinder with flattened sides, or a prism of any number of sides, as the platten or pressing surface: and the fifth, a revolving tympan frame, carrying a number of tympans, for the purpose of receiving the sheets of paper, and of conducting them into the proper situation for receiving the impression.

Plate II. Fig. 3, represents the first mentioned improvement: *a*, is the form of types; *b*, the ink-table, or flat surface, on which the ink is spread or distributed; *c c c*, are the rollers for communicating the ink to the types; *d*, *d*, *d*, are the distributing rollers, placed diagonally across the ink table, their pivots resting in slots of the carriages, *e*, *e*. The table is made to traverse backward and forward, and as the peripheries of the rollers *d*, *d*, *d*, are in contact with it, they consequently revolve, and at

the same time by their oblique position, are made to traverse laterally; hence, the ink previously deposited upon the table becomes spread, and equally distributed upon its surface, from whence it is taken up by the inking rollers, *c c c*, and communicated to the types. The distribution of the ink may be further promoted, by placing small rollers, *f f*, on the upper surfaces of the rollers, *d d*.

The patentee, in reference to this first project, states "the improvement which I here claim as my invention, is the diagonal position of the rollers, whereby they obtain an end motion in the most simple manner; and though I have here described it as applicable to an ink table, which moves under the rollers, yet I do not mean to limit myself to this application of it only, but I claim its application to the inking table or distributing surface generally, whether such table or surface moves under, or over, or against the rollers; or whether the rollers move under, or over, or against the table or surface."

The second improvement, viz. the flexible distributing surface, may be made of any suitable, pliant material, such as linen or woollen cloth, canvas, carpeting, leather, or other elastic substance. It may be made as an endless band or not, as convenience may dictate, and in some cases it would be desirable to distend it, by thin pieces of wood or metal placed across it, but in such a manner as not to obstruct its required action. The surfaces on which the ink is to be distributed, should be covered with a smooth coating of varnish, paint, or the elastic composition made of glue and treacle, or any other substance fit to distribute the ink upon.

This flexible distributing surface may be employed in the manner shewn at Fig. 4, in which *a* is the printing cylinder, *b* the inking rollers, *c* the table with the form of types, *d* the spreading rollers, for distributing the ink,

placed diagonally, as before described; *e*, is the flexible distributing surface, attached to the sliding table *c*, and passing over the roller *f*, having a weight suspended at its extremity. As the table, with the form, moves toward the pressing cylinder, it brings the flexible distributing surface, *e*, with it, which having received its supply of ink from the trough and vibrating ductor *g*, and that having been spread by the distributing rollers *d*, communicates to the rollers *b*, the supply for inking the form as it returns.

Fig 5, shews another mode of employing this flexible distributing surface, which in this instance is formed by an endless band: *a*, is the pressing cylinder, *b*, the inking rollers, *c*, the form of type upon its sliding table, *d*, the distributing rollers, placed diagonally, as before, but occasionally shifting their inclined position from right to left, by the sliding of one side of their carriage; *e*, is the flexible endless band, or distributing surface, passing over rollers, which is made to run round by a connection with the revolving pressing cylinder. The ink being supplied to this flexible surface by the ductor, *g*, it becomes distributed by the rollers, *d*, as the band advances, and ultimately the rollers *b* take up the ink and deposit it upon the face of the types, when the form passes under them. The motions required to effect these objects, may be produced by excentric wheels or cams upon the axle of the pressing cylinder, but as these means are well understood by mechanics, they are not shewn in the figure. The improvements claimed under this second head, consist simply in the "flexibility of the distributing surface, however applied."

The third improvement, designed for the purpose of inking the form of types by a system of rollers attached to endless chains or bands, is exhibed at Fig. 6, which is

an end view of the apparatus; *a*, is the table holding the form of types *b*, the system of inking rollers, connected by the endless chains which pass over the pullies *c c c*, and thereby give a continued rotatory motion to the inking rollers, in the direction of the arrows; *d*, is a cylinder of metal, turned perfectly smooth, the periphery of which is intended for a distributing surface. This cylinder is loose upon its axle, and is intended to revolve in an opposite direction to the pullies; it receives its supply of ink at certain periods from the vibrating ductor *e*; the distributing rollers *f*, lying in contact with the periphery of the cylinder, spread the ink over its surface as it revolves, and to make the distribution more uniform, the rollers, *f*, and their carriage have a small lateral or side motion to and fro, produced by inclined planes on the edges of the cylinder *d*, which work against the friction rollers *g*, in the carriage. By these means the ink is equally spread over the periphery of the distributing surface, and is thence taken up by the rollers *b*, which traverse in a contrary direction, and communicate the ink to the face of the types.

The improvement claimed under the third head is "the roller or system of rollers attached to endless revolving chains or bands;" and its application is not intended to be limited to the mode shewn in the figure, but it is proposed to be used with "an interrupted as well as a continued motion, and also in conjunction with a flat distributing surface, or an endless distributing surface, or any other surface or surfaces fit to distribute the ink upon."

The plan of the fourth improvement, viz. the pressing cylinder with flattened surfaces, or a prism of any number of sides, is shewn at Fig. 7: *a*, is a revolving prism of four sides, each side being furnished with woollen cloths, or other soft substance, proper for printing, and also a

frisket of the ordinary kind, but having squares and springs at the joints to keep the frisket open or shut in the manner of a common clasp knife: these however are not shewn in the specification. The sheet of paper is to be laid upon that side of the prism which is uppermost, and to be held there by shutting the frisket down upon it; *b*, is the table holding the types, which is made to rise and fall, for the purpose of giving the impression, and of inking the form, which motion is effected by means of the cam or eccentric wheel *c*. Upon the axis of this cam is fixed a wheel, having a toothed segment *d*, and an arm, *e*, called a wiper; which wiper, as the wheel revolves, strikes against one of the arms *f f f*, of the upper toothed wheel, *g*, affixed to the prism, *a*.

By this construction of mechanism, whenever the smaller radius of the cam is acting against the friction roller of the table *b*, the form of types will be at its lowest point, and may then be inked by hand-rollers or otherwise. As the segment wheel revolves in the direction of the arrow, the wiper *e* comes in contact with one of the arms *f*, and turns the prism over one quarter of a revolution, bringing the frisket and its sheet of paper in a situation ready to receive the impression, which is given by the further progress of the wheel, bringing the longer radius of the cam to act against the friction-roller under the table, and thereby to force the types up against the prism. A second revolution of the segment wheel will turn over the prism another quarter, and so on as long as the segment wheel revolves, by which the printed sheets may be taken off at the side of the prism as it turns, and the fresh sheets put on at the top ready for printing.

The patentee states, "I do not however intend hereby to claim as my invention, the upward and downward

motion of the type table, for the pressing cylinder or prism may be made to move upwards and downwards instead of the type table, or both may be made to move upwards and downwards toward and from each other. And I do not intend hereby to limit myself to the employment of prisms or cylinders with flattened sides, having four sides only, but to use them with any number of sides; neither do I mean to confine myself to the mode of laying on and confining the paper here shewn, but to employ tapes, webs, or any other convenient method of doing it."

The fifth improvement consists in the employment of a revolving tympan frame, carrying any desired number of tympans, for the purpose of receiving the sheets of paper, and of conducting them into the situation where they are to be printed. One mode of adapting this invention to a printing apparatus, is shewn in fig. 8., which in a side view of the machine, consisting of an iron frame work *a*, *a*, carrying the revolving tympan frame *b*, with three tympans *x*, *y*, *z*, each being intended to have a frisket of the ordinary construction, but with spring joints, as before mentioned; *d*, is the platten, and *e*, the table and form, both moving upwards and downwards in vertical grooves of the frame work, by means of the cranks and rods; *f*, is a strong spindle or shaft, in which are the double cranks for working the table and platten. It will be seen, that by the revolution of the shaft *f*, the crank rods will cause the table and platten to open from each other or close together, the impression being given by their closing and the type inked at the time when they are open; *h*, is a toothed wheel fixed to the tympan frame, and having three projecting arms *i*, *i*, *i*, similar to those described in the last figure; *k*, is also a toothed wheel, having upon

its axle a toothed segment and wiper *j*, as before described; *g*, is a toothed wheel, of similar diameter, fixed on the principal shaft *f*, the revolution of which drives the wheel *k* with its segment, and this, by means of its wiper, carries the tympan frame round one third of a revolution to every entire revolution of the wheel *g*. Thus the tympans are successively brought into the situation of *x*, where the paper is laid on, of *y*, where it is printed, and of *z*, where it is taken off.

It is to be observed, that the patentee does not limit himself to the number of revolving tympans here shewn, or to this particular construction or mode of communicating motion to them; neither does he claim as his invention, all the parts of the mechanism shewn in his specification, but he confines himself to the five particular points above described, (viz.) the diagonal position of the distributing rollers, the flexible distributing surface, the inking rollers attached to endless revolving chains, the prism or polygonal roller, and lastly, the revolving tympans. "And I hereby further declare, that I do not intend to limit the application of the above improvements to the plans or methods contained in this specification, but that I claim my patent right to all of them in every case in which they may be applied to machines for printing."

[*Inrolled August*, 1823.]

To JOSEPH BRINDLEY, *of Frinsbury, near Rochester, in the County of Kent, Ship Builder, for certain Improvements in the Construction and Building of Ships, Boats, Barges, and other Vessels.*

[Sealed 18th October, 1822.]

THIS invention consists in a method of enclosing the

various timbers which constitute the framing of a vessel in strong metallic plates; and also in attaching the planks of their bottoms, sides, and decks, by means of long strips of metal; and further in supporting the decks by means of a series of metallic rings united, and placed fore and aft the ship, boat, barge, or other vessel constructed upon this plan.

Plate II. Fig. 1, is a perspective view of the hull of a vessel, in which *a a a*, are the timbers constituting the framing, and over these the metal bands pass. They may be let into the wood, or pass along its surface; the former is recommended. These *frame bands*, as they are called, are intended to pass completely round, embracing the opposite timbers on each side, as shewn at *a* 1, *a* 2, and *a* 3; and similar metallic bands are to pass on the inner side of the frames.

Upon this frame-work, the first thickness of planking is to be laid as *b*, *b*, and over these planks the long strips of metal, called *hoop-ribs* *c c c*. These hoop-ribs pass round under the vessel, and over the planking on the other side, and are either cut off at top, or bent over the deck, and their ends rivetted together, forming a hoop, which latter mode is preferred. These hoop-ribs being secured in their proper position, another thickness of planking is worked upon them, as *d d*, having rebates cut to receive the metal strips, and over this a similar series of hoop-ribs, as *e e e*, are attached. The third thickness of planking is then laid on as *f f*, which encloses the last, and the whole is made fast by bolts.

Fig. 2, represents the section of a vessel with a series of metallic rings called *combination rings*, placed fore and aft under the lower deck, and designed for its support. These rings are united together, and rest upon the keelson, as shewn in the figure. They are made fast to

each other, and to the wood work, by flanges and bolts, or otherwise, at discretion.

Any number of hoop-ribs may be employed, and also any number of layers of planking, the dimensions of which are not limited. Iron is the metal preferred for the frame-bands, hoop-ribs, and combination-rings. For a ship of 300 tons, the frame-bands are recommended to be three-eighths of an inch, by two inches and a half in substance; the hoop-ribs a quarter of an inch by two inches and a half; and the planks about two inches by ten. The largest combination-rings are proposed to be about four inches broad by one inch thick; and the smallest about three inches and a half by three-quarters of an inch. The arrangement of the hoop-ribs may vary according to the size of the ship or boat, and vessels may be built without any frame-timbers, if hoop-ribs, as above, are properly applied, and sufficiently strong.

This specification closes, by stating the claims of the inventor under this patent, to consist in "inclosing the various timbers of boats, ships, or other vessels (particularly those which constitute the frame) between strong plates of iron, copper, or other metal or metals, or combinations of metals; and also attaching the various planking of boats, ships, and other vessels, to form their bottoms, sides, decks, and other parts, by means of long strips of iron, copper, or other metal or metals, or combinations of metals worked over the said planking, in manner herein-before more particularly described; and also supporting the decks of ships by means of metallic combination rings, as herein-before explained."

[*Inrolled April*, 1823.]

To JOHN NICHOLSON, *of Brook Street, Lambeth, in the County of Surry, Civil Engineer, for certain Apparatus for the more conveniently applying Heat to certain Instruments of Domestic Use.*

[Sealed 16th December, 1822.]

THE instruments alluded to are, first, "*an Apparatus for the purpose of heating a pair of Curling Irons;* and second, "*an Apparatus for heating an instrument called an Italian Iron,*" the construction of which instruments, or apparatus, are exhibited in Plate III.—Fig. 1, is a section of the contrivance; *a*, is a cylindrical tube closed at the bottom, for the reception of a pair of curling irons to be heated; this tube is supported by the sides of the outer vessel, of a conical form half-way down, and cylindrical below. In the bottom of the vessel a lamp is placed for the purpose of heating the tube *a* above, in which the curling irons are to be introduced; small apertures are made in the external vessel, in order to admit air below, and allow the smoke to escape above.

Fig. 2, represents the apparatus for heating an instrument called an Italian iron, used in smoothing small articles of muslin or other wearing apparel; *a*, is a hollow conical casing of metal supporting the iron *b*, and fixed thereto or made moveable to suit circumstances; at the lower part is a foot, and within a lamp for heating the iron. Apertures are formed in the sides of the casing, by which the air is admitted, and this becoming heated by the flame of the lamp which plays upon the interior, heat is disseminated over the whole surface of the Italian iron.

The vessels may be varied in form to suit other purposes; and it is in the contemplation of the patentee to

heat by these means the irons of apothecaries and druggists, for spreading plasters; and those used by wine merchants and others, for melting wax in corking bottles.

[*Inrolled 'June,* 1823.]

To JOHN STANLEY, *of Chorlton Row, Manchester, in the County of Lancaster, Smith, for certain Machinery, calculated for a more efficacious Mode of Fuelling or Supplying of Furnaces in general with Fuel, whereby a considerable reduction in the consumption of Fuel, the appearance of Smoke, and of Labour is effected.*

[Sealed 27th July, 1822.]

THIS invention is a mode of supplying the furnaces of steam-engines, and boilers in general, with coal, by means of a hopper above, containing the coal, a pair of grooved rollers to crush it, and a fan-formed scraper below, to conduct it into the furnace.

Plate III. Fig. 3, is a section of the apparatus; *a*, is the hopper, containing the coal which falls through the aperture below on to the fluted rollers, *b b*. The distance of the peripheries of these rollers may be regulated according to the size of the coal required to pass. Motion is given to the axis of one of these rollers by a toothed wheel and endless screw, (or by some other well-known mechanical contrivance) actuated by any first mover; the most convenient would probably be the steam-engines with which it may be connected. As the flutes of the two rollers work into each other, they revolve together, and thereby crush the coal to powder, or into small particles, which falling through to the plate iron box *c*, is

thence pushed forward by the revolving scrapers or fans *d d d*, into the furnace; the axis of the fans being carried round, by means of geer connected to the rollers.

The patentee states, "I do not claim the hopper, the fluted rollers, the fan, the wheels, the screws, or any other part of the machinery, in their individual character, as forming any part of my invention; all of them having been before invented and used for various purposes; but I do hereby declare, that my invention consists in the employment and application of the fan, similar to the one herein-before described, in conjunction with the hopper, fluted roller or rollers, or with any other mechanical expedient, capable of producing a regular supply of coals, so that the coals so supplied, may be by the fan, as aforesaid, thrown upon any fire or furnace."

[*Inrolled, January,* 1823.]

[See Bates's patent, "For certain machinery for the purpose of feeding furnaces of every description, steam-engines and other boilers, with coal, coke, and fuel of every kind." Vol VI. page 245.]

To RICHARD BADNALL, *the Younger, of Leek, in the County of Stafford, Silk Manufacturer, for certain Improvements in Dyeing.*

[Sealed 3d June, 1823.]

THE object of these improvements is to produce a colour from Prussian Blue that shall be permanent when employed in dyeing silk, cotton, wool, or other articles, This dye is prepared by grinding Prussian Blue as fine as possible, and then mixing it with strong Muriatic Acid in

a glass or earthen vessel. The acid is to be poured upon the ground colour, in small quantities, and the mass well stirred up during the mixing, until the whole has become of a smooth semi-fluid consistence.

The proportionate quantity of the acid to that of the colour is not important, provided the materials be well mixed, as above described. This composition is called the "*prepared Prussian Blue*," and may be used as soon as mixed, but is better if allowed to stand three or four days, and is not deteriorated by age.

If silk is to be dyed, it is first deprived of its gum by the usual means, and then immersed in a cold solution of alum in water, for three or four hours; it is then to be rinsed in clear water, which renders it in a proper state for the dye vat.

The dye is produced by the Prussian Blue, above prepared, diluted with cold water to the required strength. The silk having been introduced into the vat in hanks, suspended upon rods, it is to be there constantly turned about, that the colour may become equal throughout, and remain in the dye until the proper tint is obtained; after which it is to be washed as usual in a running stream, till the water ceases to be tinged by it. The silk is then dried, either in a shady place, in the open air, or in a drying room, the temperature of which does not exceed summer heat.

From the Prussian Blue, prepared as above, several variations of colour may be made, as greens and purples, by mixing the ordinary ingredients with the blue, or dipping the articles to be dried at several times, into the different colours to produce the tint, which operation is not particularly explained, as the substance of the invention consists in " a mode of preparing Prussian Blue, so

as to dye silk, cotton, or any other article, either alone or mixed and combined with other dyeing materials."

[*Inrolled December*, 1823.]

To ROBERT JOHN TYERS, *of Piccadilly, Middlesex, Fruiterer, for a Machine or Apparatus, to be attached to Boots, Shoes, or other Coverings for the Feet, for the purpose of travelling, at pleasure.*

[Sealed 22nd of April, 1823.]

THIS apparatus, which is called a VOLITO, is intended as a substitute for the ordinary skating shoe, used in sliding upon the ice. The volito, however, is intended to be employed for passing over any hard, smooth, level surface, by means of which the ordinary evolutions of skating may be performed upon a stone, brick, or wooden floor. Instead of the smooth bar of iron or steel placed under the sole of the shoe, as in the ordinary skate, it is proposed to substitute a series of small rollers, varying in diameter, the outer peripheries of which shall form a convex curve or segment of a circle.

Plate III, Fig. 6, is a side view of the volito, and Fig. 7, a representation of the under side of the same; *a*, is the sole, or wooden part, intended to be strapped to the foot; *b b b*, a series of rollers turning upon pivots in short staples, or ears, extending from the under side of the sole. These rollers are rounded on their edges and diminish in diameter from the centre one, in order to produce a curved bearing; *c*, is the stop at the heel part, but which may contain a roller, if the wearer should think it desirable.

The mode of attaching these rollers to the sole may be varied from that shewn in the figure, and when employed for travelling upon hard and smooth gravelled foot paths, the rollers should be made as broad as the frames will admit: sometimes it may be desirable to groove the rollers, in order to afford a broader bearing, which is considered to be desirable for learners in the art of skating, but not eligible in practising the evolutions of an expert skater. The patentee claims every mode of constructing these volitos, which he designates as the "Invention of applying a single line of wheels in place of the ordinary irons of skates."

[*Inrolled October*, 1823.]

To WILLIAM CASLON, *the Younger, late of Burton Crescent, in the County of Middlesex, but now of Rugeley, Staffordshire, Proprietor of Gas Works, for certain Improvements in the construction of Gasometers.*

[Sealed 10th of May, 1823.]

THESE improvements in gasometers are designed to effect the following objects: 1st, to enable them to perform without the intervention of water; 2nd, to dispense with the tanks heretofore employed; and 3rd, to render their erection less expensive than gasometers of the old construction.

In Plate III. Fig. 4 and 5, are exhibited sections of a building, in which this improved gasometer is represented in the two positions which its parts would assume when the gas occupied the interior, as Fig. 4; and when the gas was nearly all expelled, as Fig. 6: the respective

letters referring to the same parts of the apparatus in both figures:—*a*, *a*, is the side walls of the building (formed either square, oblong, or of any other suitable shape) in which the gasometer is erected. These walls may be made slight, as they have very little weight to support, compared to the weight of gasometers upon any of the old constructions; *b b*, is a framing made of wooden rails, and placed at such a distance from the side walls of the building, as will enable persons to pass round for the purpose of examining the gasometer, and making any necessary repairs.

The lower part of the frame work is covered entirely round with painted cloth or other suitable materials, so as to form the bottom and sides of an air-tight vessel, *c c*,: a sliding frame, *d d*, made of wooden rails, is fitted to the interior of the fixed frame-work, and moves up and down therein. This frame is supported by chains which pass over pullies, *e e e*, and *f*, and a counterpoise weight, *g*, is suspended to the reverse end of the chain to balance the sliding frame. A painted or oiled cloth is attached all round the lower edge of the sliding frame at *h*, and also round the rim, *i*, of the fixed frame-work, and closed securely at the seams, the whole being cemented and rendered air-tight at every joint. Thus a vessel for the reception of gas is formed, the capacity of which is variable according to the elevation of the sliding frame.

The gas after having been purified by any of the ordinary processes, passes from the purifier into the gasometer through the pipe *k*, where its elastic pressure acting against the bottom, *h*, of the sliding frame, raises it up; the oiled cloth at the same time is enabled by its flexibility to fold between the fixed and moveable wooden frames, as seen at Fig. 5 whence it stretches out as the moveable frame rises, until it has reached its greatest height, shewn

at Fig. 4; the oiled cloth being there fully extended, and the vessel enlarged to its greatest capacity. The superincumbent pressure of the sliding frame acting upon the gas contained within the vessel, causes the gas to be expelled through the discharge pipe, *m*, whence it passes to the mains and service pipes, as usual.

The patentee concludes his specification by saying "In describing this improved gasometer, I have necessarily mentioned several parts and materials which are not new, and are not intended to be claimed by me as such; my invention consists simply in constructing gasometers of light materials, with flexible sides, so as to dispense with water in their operation; and no tank being required, the erection will consequently be much slighter and less expensive than other gasometers, with every advantage hitherto obtained by any of the best constructions."

[*Inrolled November*, 1823.]

To WILLIAM CRIGHTON *and* JOHN CRIGHTON, *both of Manchester, in the County Palatine of Lancaster, Machine makers, for their invention of an Improvement in the Construction of the Cylinders used in Carding Engines and other Machinery employed in the preparation (for the spinning) of Cotton, Flax, Wool, and Silk, and Mixtures of the said Materials or Substances.*

[Sealed 18th March, 1823.]

THIS improvement is applicable to what are called composition cylinders, adapted to engines for combing, carding, and scribbling wool, cotton, silk, and other fibrous substances, in preparing them for the spinning machinery.

The composition cylinders, at present in use, are formed by a thick coat of plaster round the periphery of a plate-iron drum, which being less subject to warp or vary from their true figure, by the changes of temperature, than wooden cylinders, are preferred by most manufacturers. The cards (pieces of leather, set full of bent wires, for the purpose of combing the material) are usually made fast round the peripheries of these composition cylinders, by screws passing through the leather and composition into the iron drum, or, bolts passing through with nuts on the inner side. But the convenience of being able to attach these cards by means of tacks to the wooden cylinders, have induced many manufacturers to forego the advantages of the composition ones. The present improvement, therefore, is designed to embrace both advantages, viz. the convenience of the wooden cylinders for tacking on the cards, and the invariable figure which the composition cylinders preserve under changes of temperature.

The patentees propose to form their improved cylinders, by attaching three cast-iron wheels to one axle, and covering the peripheries of these wheels with plate-iron, so as to produce a drum: a portion of one of these cylinders, or drums, is shewn in Plate III. fig. 8; *a a*, is the rim of the wheel with the iron plates fastened to it by means of screws or bolts:—*b*, *b*, are a series of cast-iron boxes, extending the whole width of the cylinder, and fastened round its periphery, with spaces between each two, forming grooves for the purpose of introducing slips or ribs of wood, *c c c*; these are made fast to the cylinder also, by bolts, or screws. The periphery of the cylinder is now to be covered with a composition, or plaster, made of whitening, glue, oil, and white lead. This composition, when dry, becomes hard, and the whole may be turned to its true cylindrical figure in a lathe by means of a sharp cutting tool. The cylinder

thus formed, is now ready to receive its cards, which are to be attached round it, by placing the back of the leather against its periphery, and tacking the edges of the leather to the wooden slips or ribs, as at *d d d.* When any of these slips become injured by nailing, they may be displaced and others introduced, without materially injuring the cylinder, and which may be made up again with a little of the composition in a moist state.

This invention is defined as consisting "wholly in the application of slips, bars, ribs, or rules of wood, imbedded in the surface of composition cylinders, to receive nails or tacks for fixing of the leathers of the cards, as hereinbefore described. The method of securing the said slips of wood in their places upon the drum or cylinder, as well as the manner of framing the cylinder, may be varied at the discretion of the workman who shall construct the same. The proportions of the several parts, and the number of the slips of wood, must be varied according to the size of the cylinders, and the size of the sheets of cards."

[*Inrolled, August,* 1823.]

To THOMAS ROGERS, *of Buckingham Street, Strand, in the County of Middlesex, Esq. for an Improvement on Stays or Bodices, which Improvement is also applicable to Boots.*

[Sealed 18th March, 1823.]

THIS improvement is a new mode of forming the lace-holes or eyes of stays, corsets, boots, and other articles of dress by means of small round pieces of metal (silver or plated metal is to be preferred) which are to be perforated in the centre, and otherwise formed by pressure.

Plate III. fig. 9, represents a piece of metal termed an *eyelet-hole* in the form of a pulley or sheave; it must be made suitable to the thickness of the stay, corset, or boot to which it is to be attached; in the centre of this a hole is formed large enough to admit the lace, and the groove is for the purpose of fastening the eyelet-hole in its proper situation. The form of the hole is larger at the outsides than in the middle, which is designed to allow the lace to pass freely and prevent its wearing.

These metallic eyelet-holes may be made by any button manufacturer, and are to be attached to the stays, corsets, boots, &c. in the following way. A flat chisel or cutting instrument is employed, by which short slits are to be made in the stays in a cross direction, one for every eyelet-hole. A small tool, as fig. 10, is then employed, upon the end of which each metallic eyelet-hole is placed, and by holding the stays in the left hand, the groove of the eyelet-hole is adjusted and set in the small slits previously cut, taking care that the ragged threads are turned to the inner side.

An instrument, as fig. 11, is then employed called a tucker-in, it is a pair of pincers. In the broad part *a*, a notch is made in each blade to form a round or oval hole when closed; round the notch the blades are made thinner than at the other parts, and with this instrument the cloth of the stays is to be pinched round the metal eyelet-hole until the ragged threads are pressed in.

The operation of sewing is next performed, which is done with strong waxed thread on the two opposite sides of the eyelet-hole to close the nick or cut made in the cloth to receive it; at the same time a few turns of the thread is taken round the neck of the eyelet-hole, which takes hold of the cloth already pressed, and by which the metallic eye is perfectly secured.

[*Inrolled September*, 1823.]

Original Communications.

To the Editor of the London Journal of Arts, &c.

SIR,

I TAKE the liberty of sending a few more remarks upon the Mechanics' Institute, which I should feel obliged by your inserting in the Journal of Arts, &c. for January, after such a revision as you may judge proper.

I have in no way enlarged upon the plans already proposed; but should they ever be noticed in any way favourably, I shall be happy to render them more connected.

I have watched, with some anxiety, the formation of the Mechanics' Institute, anticipating that, in some degree, my hopes of an extensively beneficial society were on the point of being realized:—that I was disappointed you may have seen, by the little of common that there is between my humble suggestions and the ideas of the projectors of this institution. The silent reception it has met with from the greater and better portion of scientific men, is, perhaps, a comment upon its merit that renders superfluous any remark from an individual; however, as I do not profess to be so *very* scientific, and do not exactly concur in this silent judgment, I shall venture to infringe upon it with a feeble whisper, which, if it but meet with an echo, though discordant, will have performed its mission.

The formation of a new society for the promotion of art and science, appears to me a subject of such great importance, as to be deserving of the most serious attention from every individual who has a proper interest in the welfare of his country, and to be a claim-

upon him to join publicity to his opinion. If we reflect upon the great care requisite in the construction of any society, having *the benefit of mankind really at heart,* we cannot but lament that the weighty responsibility of its success should thus apathetically be cast upon a single individual. A society once established, that falls short of what it professed and ought to be, is, as existing witnesses but too plainly avouch, for ever lost to reformation. Its constructors are naturally prejudiced in favour of their own production, and thus fondly blind, are rarely conscious of its inadequacy, though even should their eyes be opened by some friendly hand, it is still more rarely that pride will allow of a public declaration of error, by any useful amendment. Hence the more extension the influence of such a society, the less chance is there of effectual improvement, and the greater the *mischief* it produces; for the inclination and support of those who are really desirous of contributing to a good purpose, are diverted into a wrong channel; and by the bad perversity of a few, institutions actually projected with benevolent views, become in a greater degree detrimental. Nominally useful, few enquire whether they be really so, and the voice of that few is wasted upon a prejudiced audience. A position generally granted must be infallibly true, and who will be presumptuous enough to impeach the correctness of a conclusion so universally satisfactory. Had a proper interest been evinced at the birth of this institution, by those most capable of framing it, we might have expected a very different production, but the time has now gone by when such aid would have proved serviceable, and we have left us but the hope, that when again so fair a prospect is opened, it will not be blighted by such chilling disregard. It is of no great use to seek the cause

of this disdain, perhaps; but it may not be amiss to hint to the future instigator of a similar scheme, that he *seek* the required support *before* he attempts to carry it into execution; for he may be assured, that *after* having once commenced upon his own resources, he will be left to proceed upon them, for the door is closed to all aid. The present form of the new institution appears so contracted in its views, that we may scarcely anticipate any very extensive benefit. There are those who ridicule the idea of giving instruction to the working classes, and refer us to the fable of the Jewels and the Swine; although I am very far from being of that number, yet, *upon the present plan,* I cannot but concur with one of them in thinking "a little knowledge" likely to prove "a dangerous thing." It is evident that a man who has to work for his daily subsistence, whatever may be his inclination, can attain but "a little knowledge," and *if he be left to apply that knowledge after his own will,* the chances are a thousand to one against its proper application; for it is but too common, that a man's attainments rank higher in a tenfold degree in his own estimation, than in that of any other person; and we have too often to lament the consequences of this conceit, not to fear them in the present instance. It appears to me that there are but two ways by which this institution might become of any material advantage, but neither of these are discernible in its plans. Either to make philosophers of the operatives themselves, or to call in the aid of philosophers. The first of these is an impracticability, by reason that a liberal education, in the first place, and subsequently continued study, are indispensable requisites. How these are compatible with the times and habits of the working classes, it would give me pleasure to see demonstrated. The second, is the ground-work of

the few suggestions I have before advanced, and seems to me the only probable means of promoting a proper union of theory with practice. By such an association, the philosopher and the mechanic would mutually benefit—the former by the observations of the mechanic, and the latter by *the attainment and proper exercise of that portion of knowledge which it is possible* for the Mechanics' Institute to inculcate. Let the mechanic devote every leisure moment to the cultivation of theoretic knowledge, he will never, unless blessed with Herculean faculties, attain sufficient to enable him to comprehend many abstruse points that may occur to him—what he does acquire will be but just sufficient to increase his perplexities, speculations will become more alluring, and he will more frequently fall a victim to illusive schemes; for in mechanical philosophy *certes* "a little knowledge *is* a dangerous thing." All this is advanced upon the supposition that the application of these acquirements is left to his own discretion; but had he the advantage of competent judges to refer his schemes to, and who would direct him in the choice of proper experiments, this would become of inestimable value to him, and his time and pecuniary resources would be spared for more useful purposes; for if his conditions were well founded, he would find those who could aid him in digesting and carrying them into practice. I have been at some pains to comprehend the plans of the Mechanics' Institute; but its "rules and orders," form so poor an index to its views, that I cannot discover any thing beyond the distribution of "a little knowledge" among the working classes. If it had in view the aid of our London institutions, I fear they will be found but imaginary "points d'appui." Were it possible for *separate* societies to produce the effect of their *several objects united in one*

association, as ours are now constituted, their aid would be but an empty name. It was a conviction of their inadequacy to any thing extensively useful, that induced an attempt to overcome the humble instrument of their re-formation, by endeavours to draw public attention towards them, and had I but powers equal to my will to benefit science, I doubt not that attention would have been granted. The Society of Arts, &c. does not, I believe, (for I judge only from the admission of gentlemen of my acquaintance) profess that its members should possess any other merit than the capability of paying the subscription. Thus they have a herd of beings attached to their corps, whose sole business or utility is to vote for the admission of their similars. However to perform the objects of this society, I am perfectly aware that science is not requisite, and I conceive it to be the most useful one of the kind that London can boast; but that its principles might be more advantageously applied, is apparent, by a view of the premiums proposed for the next season. Fifty or a hundred guineas are offered for inventions and discoveries, that few, for such a consideration, would neglect to secure by patent; moreover, models of the inventions, and proofs of their utility, must be produced, consequently they must have *been perfected and brought to the best of practice.* This is undoubtedly correct. But who would assist the poor mechanic in attaining this perfection? Scarcely any one who has made any *valuable* discovery, will seek the premium of this society upon such conditions. The model of many machines would cost more than the highest premium, and those who seek to profit by their genius, would incur this expence. It is from these causes that we have seen many a season when the most valuable

prizes have been bestowed upon subjects comparatively useless.

The several other societies of the metropolis, all *profess* to confer an honour in admitting a member. How often they really do this I will not venture an opinion, for capricious black balls are the learned judges. The institution in Albemarle Street is the only one, I believe, which professes experimental philosophy, and with the result of whose researches I am unacquainted.

It is by experiments made with a proper zeal for the advancement of science, that we may expect beneficial effects, rewards alone for completed inventions,—not the reading of "papers," upon Antediluvian bones and other rubbish (vide Transac. of our Chief Society, the pride of our land, *passim*), that will produce any practical service. Let the framers of any new project for the benefit of science, look carefully around at the *effects*, not the bare reputation of existing societies, and by careful observation endeavour to avoid the shoals which have hitherto proved so fatal. Let them examine why institutions of this kind were of such extensive benefit half a century ago, and mark whether the same cause be utterly incongruous with modern times; and above all, let them have a severely cautious eye to the banishment of *jealous dissensions and ambitious monopoly of merit,* for unanimity is the main spring of all utility. I leave my suggestions before offered without further comment to their own merit, and have been induced to try you, Sir, with these few observations, in hopes that they might induce the directors of the Mechanics' Institute, to expose to the public the secret means they may have capable of producing that immensity of good proposed, and of deifying that invaluable class of people who have

already been the saviours of Europe; and also that scientific men would condescend to break their ambiguous silence, and by an impartial opinion, destroy the baneful illusion, or confirm the stability of a useful design.

I am, Sir,

Yours, &c.

G. D. B.

Cambridge, Dec. 20, 1823.

On Oil and Coal Gas Lights.

To the Editor of the London Journal of Arts and Sciences.

SIR,

THE consideration of oil gas has been very much brought before the public of late: yet the subject does not appear to be well understood. It must be acknowledged, however, that it affords an exceedingly beautiful and steady light, when it is not enfeebled by the resistance it meets with, in passing through those *meters* that are generally used with this gas. Its brilliancy is accounted for by the circumstance of oil gas containing, in solution, a greater proportion of carbon than coal gas; its density therefore enables a smaller quantity to give a light equal to that afforded by a greater quantity of coal gas. At this point, the flames of the two gases may be considered to be similar, but with this distinction, that the oil gas burns, perhaps, if any thing, the most steadily of the two *within*, but very imperfectly *out* of, *doors*. It may therefore be a matter of indifference *to the customers, or consumers*, which of the gases they burn. If either of the gases are allowed to escape unburnt, it would be difficult to decide which produced the most offensive odour. No smell however is experienced

from either of them in burning, if the joints and fittings are sound. The oil gas is certainly of the two the most expensive to the consumer, but the difference is only a few shillings in the year, besides £6 per annum for the use of a meter.

Though the choice between the two gases may be a matter of comparative indifference *to the consumer*, it is not so to the manufacturer:—while the proprietors of the *coal* gas works are deriving a very handsome profit from the investment of their capital, the manufacturer of *oil* gas must, under existing circumstances, be a considerable loser.

This will be made manifest, by entering a little into the detail of daily practice, which is the safest *datum* to go by: for *experiments* are often made by interested individuals, with a view to serve a particular purpose. If *experiments* are at all to be admitted, they should be those that have been conducted by men, not only capable of making them, but likewise totally disinterested in their results.

Those made by Mr. HERAPATH and Mr. SAMUEL ROOTSAY, of Bristol, and referred to by PECKSTON, appear to fall precisely under this last description. They found "that one cubic foot of oil gas, of the specific gr. ·876, is only equal, in illuminating power, to 2.24 cubic feet of coal gas, of the specific gr. ·5433: that one gallon of cod oil of the usual quality, *loses about* $\frac{1}{7}$ *of its weight of carbon, by being made into gas*, and then makes about 85½ cubic feet of gas. That there is a loss of 28 per cent. of illuminating power, by converting oil into gas, instead of burning it in an Argand lamp in the ordinary way."

Let us see how the actual practice and experience of the oil gas customers tally with this:—by fixing on an Argand lamp, burning oil, with a burner of 1½ inch diameter, and giving a body and degree of light *equal* to a gas Argand burner, No. 6; and on enquiring into the actual quantity

of oil consumed by it per annum, it will be found that 16 *gallons of oil* will be the utmost quantity; and more frequently only 14 gallons, burning at the rate of 1046 hours in a year. This, at 2s. per gallon, or £25. 4s. per ton, would, with the price of cotton, amount on the *maximum* quantity, to about 40s. at the very utmost per lamp.

"Dr. Ure, of Glasgow, found that a pint of good seal oil, weighing 6010 grains, burned in an Argand lamp, 11 hours and 44 minutes, (consuming of course 512 grains of oil in an hour,) and the light given out was equal to 3½ *lbs. of mould candles 4 to the lb.*" This is about 11 gallons for one year, or 1043 hours, and giving a light equal to 3½ lb. of mould candles 4 to the lb. An Argand, No. 6, burning oil gas, will not give a light by any means equal to this.

However, we shall content ourselves by stating the consumption of a common oil lamp, giving light equal to an oil gas burner, of No. 6, at 16 gallons.

Now it has been proved that the best cod or Greenland oil, free of soot, will not on an average give more than 80½ cubic feet of gas, per gallon; but this can be easily determined, if disputed, by a reference to the books kept at the oil gas stations. It has been likewise found, by a reference to the sums actually paid, by the consumers of oil gas, that they more frequently burn per hour, above two cubic feet of oil gas than under it. The account they give, is this—"When we turn the gas fully on, to give a good light, we find about two feet, in round numbers, consumed per hour; and when turned on moderately, 1½." The turning on *fully* is the criterion. Consumers and their servants in general cannot, and *will not* attend to the modification. But suppose we take 1¾ cubic foot per hour, per Argand, No. 6: this for 1046 hours per annum, would amount to 1825 cubic feet, standing the manufac-

turer (as shall be presently shown) 2*l.* 13*s.* 10*d.* calculating 90 *feet* to be obtained from 1 gallon of oil, and the customer or consumer paying 4*l.* 11*s.* 3*d.*—at the rate of 5s. per 100 feet. On examining the rentals of nine o'clock burners per annum, of No. 6, Argands, 4*l.* 11*s.* 3*d.* will be found to be rather below the average.

To produce 1825 cubic feet of oil gas, at the rate of 80 feet to the gallon, 22¾ *gallons of oil* are consumed! Here is an evident *loss* of nearly one-third of the quantity of oil sustained *by the tedious and expensive process of converting oil into gas.* How is this compensated? Not surely by the difference in the labour saved to the customers; for it is not, perhaps, generally known, that an *oil gas burner* requires considerable attention and care to keep it clear of an unctuous, viscid substance, formed by the combustion of the gas in the orifices of the burners, not unfrequently choking them up entirely. This is particularly the case with street lamps, or those placed in cold situations. Small is the inducement then, which can be held out by an oil gas company to their customers, to pay 4*l.* 11*s.* 3*d.* for the same degree of light which they could obtain, by a very little additional labour, for 2*l.* per annum; and less to the manufacturer, who cannot produce the same degree of light under an actual outlay of 2*l.* 13*s.* 10*d.*!

But how the manufacturers are paid, will be best illustrated by the single fact that, although oil gas companies have been established in sundry places, for several years past, none of them have ever divided a real profit to their proprietors. The adjective *real* will be understood.

Coal gas burners require neither care nor labour to be bestowed on them. The rental of a coal gas No. 6 Argand, till nine o'clock, is 4*l.* per annum: coal gas is sold for 15*s.* the thousand cubic feet. The ratio of three-fourths of oil gas to five of coal gas, in illuminating power, will be

pretty nearly ascertained by this *practical* observation:—that 1043 hours consuming at the rate of five feet per hour per burner will amount to 5,215 cubic feet of coal gas per annum, which, at 15*l.* per thousand feet, would be 3*l.* 18*s.* 6*d.* or within 1*s.* 6*d.* of the sum *actually paid* by the consumers.

Then say:—as $\underset{\text{oil gas}}{1825} : \underset{\text{coal gas}}{5215} :: \underset{\text{oil gas}}{1} : \underset{\text{coal gas}}{2\frac{313}{365}}$, or $\frac{6}{7}$, or, in round numbers, as 1 to 3 nearly.

Again—it has been calculated, but not necessary to go into at present, that, assuming oil at 20*l.* a ton, and that one gallon will give as much as 90 cubic feet, 1000 cubic feet of oil gas will cost 29*s.* 6*d.*, and 1000 cubic feet of coal gas 6*s.* 5*d.*: the expenses of their production will, therefore, relatively stand thus:

	£.	*s.*	*d.*
1825 cubic feet of oil gas at 29*s.* 6*d.* per thousand feet . . .	2	13	10
5215 ———— coal gas, at 6*s.* 5*d.*	1	13	5

Here is a most remarkable difference *on only one burner*: the detail is ready for publication, taken from actual practice. The difference between the above prime costs and the amount received from the customers, is 1*l.* 17*s.* 5*d.* on the former, and 2*l.* 6*s.* 7*d.* on the latter. But it must be observed that these differences are never realized by either party; for almost all gas establishments are obliged to supply, with gas light, a certain proportion, more or less, of *public lamps*, which, instead of paying 5*s.* per hundred feet for oil gas, or 15*s.* per thousand feet for coal gas, do not, it is well known, pay one-fifth of either of these sums. If we suppose, then, oil gas to burn $1\frac{3}{4}$ feet per hour per lamp for 365 days, on an average of 10 hours per night, at 29*s.* 6*d.* per thousand feet, it will amount, per lamp, to 9*l.* 8*s.* 4*d.* per annum; and the coal gas to burn at the rate

of five cubic feet per hour, will amount to 5*l.* 15*s.* 6*d.* per annum; but the general allowance to the companies is only from 3*l.* to 4*l.* per lamp per annum.

From this it will be seen that the loss sustained, on this score, by the oil gas companies, must be great; while, on the other hand, that of the coal gas companies will be comparatively small, from the *great difference* in the first cost of their respective gases—the proportion of loss being in the ratio of 1*l.* 15*s.* 6*d.* to 5*l.* 8*s.* 4*d.* *per lamp.*

At Bristol they have managed to get rid of their proportion of supplying the public lamps with gas, by paying to the coal gas company, in lieu of it, 600*l.* per annum. In that case, they may be able to do some good at Bristol: it was a very judicious arrangement; and their having made it, is a tacit confirmation, on their part, of the accuracy of this statement.

These few *facts*, which cannot be disputed, will, in some measure, account for the inability of the oil gas companies to divide a profit to their share-holders. It is placing the matter in a point of view which any man may examine and understand, and satisfy himself upon. They have been called for by the periodical efforts that have been lately made in the Annals of Philosophy, to recommend the adoption of *oil* gas.

I am, Sir, yours, &c.

A. H.

Stratford sur le Bow,
Dec. 29, 1823.

To the Editor of the London Journal of Arts, &c.

Sir,

As a partial contributor to your monthly repository of science, I beg to enclose a copy of an article which appeared

in the Morning Post and Chronicle of the 23rd instant, and to request information upon the subject thereof:—

"The carriage, the property and invention of the proprietor of the exhibition of the Indian Venus, &c. lately exhibited in these towns, and which travels without the intervention of either horses or steam, left this town on last Tuesday morning, for Tavistock, amidst a concourse of persons who were much surprized at the ease and velocity of its movements. It is propelled by machinery, which is put in motion by the person who sits in the carriage. The vehicle is very light, and has three wheels."—*Plymouth Paper.*

If the facts therein stated are true, the invention must be considered as the grandest achievement of human industry and mechanical talent that has ever been submitted to public notice;—if false, the fallacy of the statement ought to be immediately exposed.

I am, &c.

A Traveller.

London Institution,
Dec. 26th, 1823.

[We have no knowledge of the machine above-mentioned, but trust some of our friends in the West will favour us with a description of its construction.—*Editor.*]

To the Editor of the London Journal of Arts.

Sir,

I was glad to see in your interesting Journal, some notice taken of the factitious airs, and that they are taken up and applied to the cure of diseases by some judicious per-

sons. I have often lamented that the use of them has been so much neglected. It is' difficult to account for this, unless we refer it to the tedious application of them requiring much time and patience, far more than any medical man can spare. Still the manual performance might be under their direction if they would fully acquaint themselves with the subject. But it is painful to see the opposition that in many cases has been made to their use. To find such a man as Mr. le Beaume avow that he has experimented upon all the factitious airs, and never knew any benefit derived from any of them. Such an assertion in the face of known and plain facts, must shew his experiments were very ill conducted, or that he was totally ignorant of the right application of them. I can avow that in more than twenty cases that have come within my own knowledge, the carbonic acid gas has been singularly beneficial, and more than three times the number of cases that can be ascertained as facts have been relieved and cured.

When this gas became the subject of Dr. Priestley's experiments, (then called fixed air from its fixable nature in many hard and solid substances,) he proved its antiputrescent powers by restoring putrid animal flesh to a state of sweetness. Rejoiced at the discovery, and naturally judging that it might have the same power over the living subject, he wrote to his friend Dr. Percival an account of his discovery, hoping in his hands and under his direction it might benefit suffering humanity. In some experiments made by the doctor, its nature and tendency was established; but being tried upon a very small scale its beneficial quality did not very strikingly appear, and being advanced in years, he recommended the farther trial of it to his successors.

The further experiments of Sir John Pringle and Mr. M'Bride fully demonstrated the advantages that might be

obtained by it, and abundance of facts have proved that mortifications have been arrested in their progress and speedily removed. The manner in which this gas operates to effect a cure is clear and decisive (though some medical gentlemen say the *modus operandi* of medicine is not to be regarded, but to me it appears an important matter). The gas in question is a component part of animal flesh, and while it contains its proper proportion of it no process of putrefaction can take place; but when decomposition begins from whatever cause, this gas makes its escape, and farther decomposition proceeds, till putrefaction totally destroys the substance. In the dissolution of our food by digestion, this gas escapes in the stomach, and is absorbed to renew that portion carried off incessantly by the lungs: and it is manifest that when men have lived long upon salt provisions, as on board of ship, that they have had attacks of the scurvy for want of the proper supplies of that gas which salt provisions cannot give: this is evident from the cures so suddenly obtained when they have a supply of fresh vegetables, which contain a large quantity of that gas; add to this, that the fatal disease of the scurvy is, or may be wholly prevented by a constant supply of any of those articles of provision that contain a sufficient portion. Mr. M'Bride, in one of his experiments, proved that the gas exhaling from a fresh piece of animal flesh would sweeten a putrid portion of flesh if connected without the interposition of the atmospheric air. The experiment was made in two phials, one of which contained the putrid and the other the new flesh: these phials were connected with a bent tube sealed close, and in a few hours the gas that escaped from the fresh meat sweetened the putrid flesh. I may farther observe, it is not this gas only which makes a component part of the animal system, but the two distinct portions of the atmospheric air make up component parts of the animal system;

and it is obvious to common sense that health cannot be continued in situations where these cannot be obtained in sufficient quantity. Does it not strike the mind as reasonable, that when a component part is wanting, and a disease occurs on that account, the most ready way in which it can be supplied must be the shortest and most certain way of restoring health. The absorbent vessels of the skin or the lungs will imbibe a sufficient quantity, for the purposes they are wanted: Nature herself teaches this mode, and it certainly is the most rational. In vegetation the ground will produce good crops of certain grains or seed plants not more than two years together, and then it is said the ground is exhausted. The fact seems to be, the ground is robbed of some certain quality required particularly for that kind of plant, and therefore can supply it no longer; other things not requiring so much of that particular substance will thrive, and in due time the ground will acquire that quality again from the atmosphere or from manure. Where wheat can obtain no silex in its growth, its stalk can have no strength. It is the same with animal nature. If a hen cannot get any thing from which she can extract carbonate of lime, her egg will be laid without a shell. If phosphate of lime is wanting in human bones they will become brittle and break with a touch. It would seem to me the best and surest way of studying pathology, to endeavour to discover what component parts are wanting, and what are redundant in the human system, then something like a basis in the cure of chronical diseases might be established. Do not many diseases arise from depositions of extraneous matter formed from a redundance of some component parts, as osseous, chalky, or stony substances? When this is ascertained, might not a change of food, with the assistance of medicine, prevent or alleviate the evil. Was this mode of treatment established, might we not banish quackery,

which is a mischief under which the nation groans? While people are prejudiced in favour of specifics, quackery will never cease. It is only by a general knowledge of the nature and causes of health and disease, that the public can defend themselves from the danger of imposition, whether from quacks, or men careless and ignorant in their profession. Having thrown out these few hints, I leave you to make what use of them you please.

I am, Sir, yours, HUMANITAS.

Review of New Publications.

White's New Century of Inventions.

THE fifth and last part of this ingenious performance, the former of which were mentioned in our fifth and sixth volumes, is now completed; the subjects are as follows:—

An Adding Machine for casting up large columns of figures.

A Rotatory Punch Machine, adapted to an engraving-machine, invented also by the author.

A Portable Pump, to be worked by the feet.

Bisecting Compasses.

A Musician's Pitch-fork, with various tones.

A Method of obtaining a Level at Sea.

Another mode of obtaining the same object.

A Fire-escape, on a retarding principle.

Another Fire-escape, calculated to break the fall.

A Rotatory Chocolate Mill.

A Rotatory Mangle.

A Machine for driving the Shuttles of a Power Loom.

An Air-pump, or essay towards completing the vacuum.

An Inclined Water-wheel.

A Vessel to assist in taking medicine.

An Æro-hydraulic Machine for raising water in large quantities.

Another Wind-machine, furnishing immense power.

A Centrifugal Mirror, for collecting solar heat.

A second Mirror, for collecting the Sun's rays.

An Engraving Machine for large Patterns.

There is certainly a very great display of ingenuity in the "New Century of Inventions," and many projects which may be usefully adapted to other purposes; but the greater part of the schemes are theoretical only, and never can be converted to practical uses. The author and inventor has, however, proved himself to possess a genius far above the common order of schemers: and though we cannot give our unqualified assent to the originality of all his ideas, or to the correctness of all his principles, yet we feel bound to speak of the work as a valuable acquisition to mechanical science.

Novel Inventions.

Hatching Chickens by Steam.

The attempts which have been heretofore made to hatch chickens by artificial means, have appeared to us too ludicrous to entitle them to serious consideration. We have, however, within these few days, been induced to visit an attempt of this kind, which really possesses so much ingenious contrivance, founded upon philosophical principles, that we cannot forbear devoting a page to the subject. The inventor of this new art, is named Barlow, and exhibits his process in Lamb's Conduit-street, near the Foundling Hospital, London.

The hatching of chickens by artificial heat, has been successfully practised in Egypt from time immemorial, by the inhabitants of a village called Berme, who, at certain periods, travel into distant parts of the country with their apparatus, and hatch the chickens for the peasantry, in a sort of box, heated by a lamp. The mode of managing this business is, however, a secret, and has been attempted in several parts of Europe without success, until the present apparatus was constructed and adapted to that purpose by Mr. Barlow.

A large iron box, called the oven, is divided into several compartments, each of which is heated to a suitable temperature, for the purpose, by means of steam passing from a boiler through closed passages beneath, and on the sides. In the different compartments of this oven the eggs are placed according to their state of advancement, beginning the process by introducing them at the lower temperature and shifting them to the warmest situation as the embryo proceeds towards maturity. The adjustment of the proper and uniform warmth of the hatching chambers, is an important feature in the process, and this is ingeniously contrived by thermometrical valves, which open and shut the steam passages as the atmosphere of the chambers sink or rise in temperature. During the progress of the operation an aqueous vapour is exuded, from six to ten grains per day from each egg, which, in an oven containing 1500 eggs, becomes considerable; this moisture is carried off by an hydrometer. Twenty-one days is the natural time of incubation for hatching domestic fowls, partridges, and pheasants: thirty days are required for ducks, geese, and turkeys; and in the same space of time these animals are uniformly hatched by artificial mode. The process can, however, be expedited

or retarded by the apparatus, but the chickens are then seldom found to be healthy and strong.

This system of hatching by steam has enabled Mr. B. to exhibit to his visitors some very curious facts connected with the natural history of birds, and to shew the gradual progress of the embryo until the moment that the perfect animal starts into life.

" Scarce is the egg exposed to the heat in the *oven* twelve hours, when some lineaments of the body of the embryo chick begins to appear. The heart begins to beat at the end of the *second day:* at that time it has the form of a *horse shoe.* On the *third day* two vesicles with blood, the pulsation of which is very evident, one is the left ventricle, the other is the root of the great artery; one auricle of the heart appears about the fiftieth hour, which resembles lace folded back upon itself:—the beating of the heart may now be observed in the auricle, and afterwards in the ventricle. The *fourth day* the wings may be distinguished; and, on the head, two knobs for the brain, one for the bill, and two others for the fore part and hind part of the head; the two auricles, visible already, approach nearer the heart than they did before. On the *fifth day* the first auricle that appears seems to have two horns; but it afterwards appears to be auricles. About the *sixth day* the liver is seen; the first voluntary motion is observed at the end of one hundred and thirty-one hours; at the end of one hundred and thirty-eight hours, the lungs and stomach become visible. And, at the *seventh day*, the intestines, the loins, the upper jaw, and two ventricles may be seen; and two drops of blood, instead of one, which was seen at first, and the brain acquires some consistence. At the *eighth day* of incubation the bills open, and the flesh appears on the breast. At the end of one hundred and ninety-

four hours the sternum, (*i. e. the breast bone*) is seen; and on the *ninth day*, the ribs come out of the back; the bile and the gall bladder become visible. On the *tenth day* the bile becomes green; and if the chick be taken from its integuments, it can move itself insensibly. *Eleventh day*, the feathers begin to shoot; and the scull becomes grisly. At the *twelfth day* the eyes appear; and the ribs are perfect at the two hundred and eighty-eighth hour. On the *thirteenth day* the spleen approaches the stomach; and on the *fourteenth* and *fifteenth day*, it increases in size and bulk. On the *sixteenth day* the beak opens and shuts; and, about the *eighteenth day*, the chick utters its first cry. Its strength then gradually increases, till it sets itself at liberty by breaking the shell in which it was confined."

About twenty-four hours before the shell bursts open, the yolk of the egg (which till that time remains entire) is drawn into the intestines of the chicken, which supplies it with nutriment for about thirty hours after it has been hatched.

The chickens soon after they escape from their shells, are removed from the oven and placed in cages, under the oven, in an atmosphere of about 80° of temperature; they are kept in these cages for three or four days, the warmth being gradually reduced, and are at the expiration of that time set at liberty to feed in the open air, where they generally thrive, and soon become strong and large birds, several of which reared in this way, Mr. B. exhibits.

The advantages proposed by this plan, are, that the mother hen may continue laying eggs during the time that she would in the natural way be occupied in the hatching and rearing her chickens; which generally causes about three months of barrenness at that season of the year when she ought to be most prolific.

Instrument for drawing Curves and Ellipses.

Mr. Jopling, of Somerset Street, Portman Square, has invented an instrument for the delineation of curved lines, which is extremely simple for an apparatus of its powers. It is capable of drawing, with the utmost facility, an indefinite number of curves, comprehending those which have been the subject of mathematical research.

To mechanical draftsmen and architects, it is calculated to become extremely useful, and to mathematicians the employment of the apparatus will suggest a variety of enquiries in reference to new and curious curves whose proportions have not as yet been investigated.

Polytechnic and Scientific Intelligence.

Royal Society.

This society commenced its meetings for the winter, on Thursday, November 20th, 1823, when Sir E. Home, V.P.R.S., read the Cronian Lecture, illustrating the subject of muscular motion by the structure of the brain in the human species; and also in several varieties of animals, according to the microscopical observations and delineations of Mr. Baur; a series of that gentleman's drawings were annexed. The Rev. E. Jenner read part of a paper, entitled, "some observations on the migration of birds," the remainder was concluded on the 27th. This communication was taken from the manuscripts of the late Dr. Jenner, F.R.S. uncle of the above gentleman. Major-general Sir G.

Murray, John Rennie, Esq. Dr. Cresswell, and Professor Barlow, have been admitted as fellows of the institution in the course of the month.

Society of Arts.

The meetings of this Society were resumed on Wednesday, November 5th, since which time the several Committees have been actively engaged in the examination of the following subjects, received during the recess :—

Committee of Polite Arts.—A new specimen of diamond type; encaustic painting; a new process in aquatinta; a stereotype bank-note, intended to avoid the possibility of forgery, in which the words of the note are left white, and produce an infinite variety of intersections with very small types, which form the dark ground; another, in which the face of the note is printed in red and blue, and the back in yellow fancy work, consequently, when the note is held between the eye and the light, the intersections appear orange and green.

Joint Committee of Polite Arts and Chemistry.—A new metallic compound, for the use of engravers, in the place of copper; a new composition of red glass.

Committee of Mechanics.—A temporary rudder, composed of spars and pieces of old cable; an anchor, with the corners of the flukes rounded, to prevent fouling; a screw-wrench, in which the jaws are retained at any required distance, by a very acute wedge inserted in the handle; a mode of fixing the small windows in the backs of carriages; a machine for covering buttons; an elevating fire-escape, composed of cross-bars, on the principle of the lazy-tongs; two sun-dials; a dumb jockey to be affixed to the saddle,

for the purpose of breaking young horses; a mode of fixing carriage-lamps to the foot-board; a secret lock; a species of case for the ears, to assist the hearing of persons who are partially deaf; a float, or life-preserver, to be used in cases of shipwreck consisting of a spar attached by its ends to two casks; a combined weight and pulley for clocks, similar to the toy called a bandalore; a proposition for grinding mirrors and lenses; projecting letters, for large dials or signs, consisting of gilt glass, set in wood or metal frames of the requisite form; an iron-chest lock, in which the four bolts are separate, and are shot progressively by the revolution of the key; compound spectacles, to answer the purpose of an opera-glass and a microscope; the mode of paving used in Tuscany; a joiner's plane, with several moveable soles to the same stock, calculated for hollow or spherical work; a lamp, the burner of which is at one end of a balance, which preponderates when it is filled with oil, but rises when by the consumption of the oil that end becomes the lightest, and by its rising obtains a fresh supply from the reservoir above—at the same time also an additional length of wick is protruded, by which both oil and cotton are perpetually supplied to the lamp by its self-action; a new mode of making an original screw: a short screw is cut in the lathe in the ordinary way,—it is then mounted in a cleft stock or handle, similar to a common milling tool, and is pressed against the cylinder (in the lathe) on which the screw is to be produced, which by its revolution gives a longitudinal as well as rotary motion to the tool, and forms a helical indentation on the surface of the cylinder: it is then worked up with the common screw tool, being occasionally corrected by the tool with which the lead is given; two instruments for the solution of problems in trigonometry, by the old expedient of three graduated scales, representing the three sides of the triangle; a

pitch kettle and ladle, for paying the seams of ships; a pump with four barrels, the buckets of which are worked by cams fixed on the faces of a pair of spur-wheels.

COMMITTEE OF COLONIES AND TRADE.—Extract of Mimosa bark from New South Wales, and a kangaroo skin tanned with the same; some leaves of the *Phormium tenax*, the fibre of which is the New Zealand flax, and some specimens of rope manufactured of the flax; some other vegetable specimens; on the exportation of British-cured herrings.

METEOROLOGICAL SOCIETY.

A SOCIETY bearing this name has recently been established in London, and as we perceive under the sanction of some of the most eminent names in the world of Science. At the first meeting of the friends of this Institution, Dr. Birkbeck was called to the chair, and after the object of the meeting, and the views and intentions of its projectors had undergone an able discussion, the following resolutions were agreed to.

That a Society be formed, to be called "the Meteorological Society of London."

That the business of this Society shall be conducted by a President, Vice-Presidents, Treasurer, Secretary, and Council; and that the number of Vice-Presidents and members of the Council be determined at a subsequent Meeting.

That Mr. F. Wilford be requested to officiate as Secretary (*pro tem.*,) and authorised to send a printed summons to attend the next Meeting, to each person who shall become a subscriber.

That an annual Subscription of two Guineas be paid in advance by every Member of this Society.

Other resolutions were passed calling upon all friends to the advancement of Science to become Members, &c.; after which the Meeting adjourned.

The infant Society accordingly met, attended by a numerous and highly respectable assemblage of friends and patrons; and further steps were taking towards its organization. We want now only a society devoted exclusively to Chemical Pursuits, and then, with a judicious *Institution for the Practical Improvement of our Operative Mechanics*, every part of the extensive field of science will be in a state of culture. We have already societies devoted to the study of the Arts, Botany, Horticulture, Medicine, Mathematics, Geology, and Astronomy; and generally speaking, the object of these various Institutions are so ably followed up by their respective members, as to almost supersede the old Royal Society.

New Patents Sealed, 1823.

To Joseph Bourne, of Derby, in the county of Derby, stone-bottle manufacturer, for his invention of certain improvements in the burning of stone ware and brown ware in kilns or ovens, by carrying up the heat and flame from the furnace or flue below to the middle and upper parts of the kiln or oven, either by means of flues or chimnies in the sides thereof, or by moveable pipes or conductors to be placed within such kilns or ovens; and also by increasing the heat in kilns or ovens by the construction of additional furnaces or fires at the sides thereof, and to communicate with the centre or upper part of such kilns or ovens; and also by conveying the flame and heat of one kiln into another, or others, by means of chimnies or

flues, and thus permitting the draft and smoke of several kilns or ovens to escape through the chimnies of a central kiln or oven of great elevation, whereby the degree of heat is increased in the several kilns or ovens, and the quantity of smoke diminished.—Sealed 22d November—2 months for inrolment.

To John Slater, of Saddleworth, in the county of York, clothier, for his invention of certain improvements in the machinery or apparatus to facilitate or improve the operation of cutting or grinding wool or cotton from off the surfaces of woollen cloths, kerseymeres, cotton cloths, or mixtures of the said substances, and for taking and removing hair or fur from skins.—Sealed 22d November—2 months.

To Thomas Todd, of Swansea, South Wales, organ builder, for his invention of an improvement in producing tone upon musical instruments of various descriptions.—Sealed 22 November—6 months.

To Samuel Brown, of Windmill-street, Lambeth, in the county of Surrey, gentleman, for his new-invented engine or instrument for effecting a vacuum, and thus producing powers by which water may be raised and machinery put in motion.—Sealed 4th December—6 months.

To Archibald Buchanan, of Calrue Cotton Works (one of the partners of the house of James Finlay and Co. merchants, in Glasgow), for his invention of improvements in machinery heretofore employed in spinning-mills in the carding of cotton and other wool, whereby the top cards are regularly stripped and kept clean by the operation of the machinery, without the agency of hard labour.—Sealed 4th December—4 months.

To Josiah Parkes, of Manchester, in the County Palatine of Lancaster, civil engineer, for his invention of a certain method of manufacturing salt.—Sealed 4th December—6 months.

To George Minshaw Glascott, of Great Garden-street, Whitechapel, in the county of Middlesex, brass founder; and Tobias Michell, of Upper Thames-street, in the city of London, gentleman; for their invention of certain improvements in the construction or form of nails, to be used in or for the securing of copper and other sheathing on ships, and for other purposes.—Sealed 9th December—6 months.

To Thomas Horne, the younger, of Birmingham, in the county of Warwick, brass founder, for his invention of certain improvements in the manufacture of rack pullies in brass or other metals.—Sealed 9th December—6 months.

To William Furnival, of Droitwich, salt manufacturer, and Alexander Smith, of Glasgow, master-mariner, for their invention of an improved boiler for steam engines, and other purposes.—Sealed 9th December—6 months.

To Sir Henry Heathcote, of No. 23, Surrey-street, Strand, in the county of Middlesex, knight, and captain in the Royal Navy, for his invention or discovery of an improvement of the stay-sails generally in use, for the purpose of intercepting wind between the square sails of ships and other square rigged vessels.—Sealed 13th December—6 months.

To Jarvis Boot, of Nottingham, in the county of Nottingham, lace manufacturer, for his invention of improved apparatus to be used in the process of singeing lace, and other purposes.—Sealed 13th December—6 months.

To Pierre Jean Baptiste Victor Gosset, of Queen-street, Haymarket, in the county of Middlesex, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, by which he is in possession of an invention of a combination of machinery for producing various shapes, patterns, and sizes from metals or other materials capable of receiving an oval, round, or other form.—Sealed 18th December—2 months.

CELESTIAL PHENOMENA, January, 1824.

D.	H.	M.	S.	
1	7	0	0	☉ in Perigee.
1	22	3	0	☽ in conj. with ☿ long 9s 22° 45′ ☽ lat. 0° 24′ N. ☿ lat. 2° 9′ S. Dif. of lat. 2° 23′
3	0	0	0	☽ in Apogee.
7	0	0	0	Clock 6′ 21″ before ☉.
9	0	36	0	☽ in □ first quarter.
11	5	0		☽ in conj. with ♄ long. 1s 17° 2′ ☽ lat. 4° 43′ N. ♄ lat. 2° 16′ S. Dif. of lat. 6° 59′.
11	0	0	0	♅ long. 9s 11° 35′ lat. 0° 21′ S.
12	0	0	0	Clock 8′ 26″ before ☉
14	10	45	0	☾ in conj. with ♃ long. 4s 3° 46′. ☽ lat. 1° 19′ N. ♃ lat. 0° 2′ S. Dif. of lat. 1° 21′.
15	0	0	0	Eclipse of the moon partly visible, begins 19h 18′ sets eclipsed at 19h 44′ 33″ when 3° 39′ on north limb have become dusk.
15	20	50	0	Ecliptic opposition ☉ Full moon.
16	0	0	0	Moon in Perigee.
17	0	0	0	Clock 10° 15′ before ☉
19	0	0	0	☿ at his greatest elongation.
20	12	38	0	☉ enters Aquarius.
20	22	15	0	☾ in conj. with ♂ long. 6s 9° 57′. ☾ lat. 5° 12′ S. ♂ lat. 2° 48′ N. Dif. of lat. 8° 0′
22	13	46	0	☾ in □ last quarter.
23	0	0	0	Clock 2′ 2″ before ☉
24	0	0	●	☿ in perihelion.
26	14	45	0	☾ in conj. with ♀ long. 6 22° 28′ ☾ long. 2° 20′ S. ♀ lat. 2° 21′ N. Dif. of lat. 4° 41′.
29	0	0	0	Clock 13′ 23″ before ☉
30	0	0	0	☾ in Apogee.
30	15	48	0	Ecliptic Conjunction ● New Moon.
31	3	10	0	☽ in conj. with ☿ long. 10s 15° 56′ ☽ lat. 2° 25′ N. ☿ lat. 3° 5′ N. Dif. of lat. 1° 20′

The waxing moon ☽—the waning moon ☾.

METEOROLOGICAL JOURNAL, Nov. and Dec. 1823.

1823.	Thermo.		Barometer.		Rain in inches.	1823.	Thermo.		Barometer.		Rain in inches.
	Higt.	Low.	+	—			Higt.	Low.	+	—	
Nov.						Dec.					
26	53	45	30,12	. .	. .	10	39°	28°	30,27	—,17	. .
27	50	42	+,09	30,01	. .	11	46	36	,16	29,95	. .
28	49	42	29,96	29,85	. .	12	41	38	29,76	—,70	. .
29	51	45	+,66	—,46	,45	13	41	32	+,98	—,79	. .
30	56	42	,39	—,36	. .	14	40	27	30,09	30,07	. .
Dec.						15	43	32	+,18	—,06	. .
1	52	43	,79	—,58	,25	16	47	36	,10	29,86	. .
2	51	39	,52	—,30	,2	17	48	38	29,60	28,91	. .
3	50	36	,53	—,26	,15	18	40	30	,41	29,38	. .
4	45	41	,49	—,27	,1	19	34	28	,66	—,54	. .
5	42	30	,70	—,66	,1	20	42	25	,30	—,12	. .
6	40	33	,93	—,36	,225	21	40	31	,29	—,12	,625
7	39	28	30,37	30,30	,175	22	40	35	,74	—,45	. .
8	45	30	+,34	—,20	. .	23	43	30	,70	—,69	. .
9	42	33	,25	—,20	. .	24	48	40	,90	—,79	,3
						25	50	40	,85	—,80	,075
						26	46	37	,76	—,40	,3

Lower Edmonton. C. H. ADAMS.

LITERARY AND SCIENTIFIC NOTICES.

Mr. Belzoni. — This enterprising traveller having been unable to procure any conveyance from the Island of St. Jago to the River Gambia as he wished, has been conveyed in his Majesty's brig Swinger, from Teneriffe to Cape Coast, whence he proceeds to Benin, the point from which he now proposes to commence his journey of investigation: he is attended by a native of *Houssa*, on the banks of the Niger. Mr. Belzoni has assumed the Moorish costume, which very well accords with his appearance, having a beard of six months growth and mustachios.

We sincerely wish this indefatigable traveller may succeed in the grand object of exploring the Niger; but fear the difficulties he will meet with will exceed his expectation, as he takes a route entirely novel.

London Institution.—During the Christmas Vacation, a short course of eight lectures will be delivered in the theatre of this Institution, by Mr. C. F. Partington, upon the Steam Engine and the Mechanical Powers. To commence on Thursday, the 8th of January, 1824, at one o'clock in the afternoon, and to be continued each succeeding Monday and Thursday, until the course shall be completed.

Dr. Martin, of Bridge-street, Blackfriars, proposes to deliver a course of lectures in January, on those important objects which are embraced by the Royal Humane Society, and which, equally interesting to the philanthropist, philosopher, and medical practitioner, regards the preservation of life under circumstances of adventitious and imminent danger, especially from the effects of submersion, strangulation, suffocation by noxious vapours, poisons, &c. to be illustrated by models and experiments —by drawings and specimens of poisonous plants and other noxious bodies.

Tomb of Canova. — Thorwalsden the great Icelandic sculptor in Rome, is at work on a monument for the tomb of this justly celebrated artist, it is to be placed in the church of Venice, which was building at Canova's expense at the time of his death.

Fire Damp.—A scheme is suggested by a Mechanic of Stafford, for lessening the danger from the explosion of fire-damp in coal mines, by employing bellows to be worked by the steam-engine, being placed one or two hundred yards from the shafts. Atmospheric air would be propelled by a main pipe down the shaft, and thence conducted by smaller pipes, having regulating stop-cocks, to those parts of the mine where the colliers are at work. The stream of air will have force equal to a common current above ground. The fire-damp would thus be displaced from the situation occupied by the miners, or so much diluted as to render it harmless, and ultimately be forced out at the mouth of the pit.

Encyclopedia of Heraldry. — The first part of a new work on this now almost forgotten subject is about to be published by William Berry, author of the Genealogia Antiqua, &c. &c. &c. It is, we understand, to comprise the whole science of heraldry, hereditary dignities, orders of knighthood, the arms of sovereign states, cities, towns, public institutions, corporate bodies, &c., and will be illustrated by 108 explanatory plates. It will be succeeded by monthly parts till finished.

Rossini.—Memoirs of this justly celebrated composer, by the author of the Lives of Haydn and Mozart, is announced for publication.

Dr. Kitchener is, we understand, engaged on a work for the improvement of vision, and preservation of the eyes.

Distillation of Sea-water. —M. Clement, a French chemist, has invented an economical still, by the use of which, with one ton of coal, from six to seven tons of fresh water may be obtained.

Corfu.—The University of this island owes another important benefit to Lord Guildford, in addition to the library he transported from Paris, viz. a collection of 20,000 stamps of Grecian Medals, &c. with their description, by M. Miounet, of the Royal Library of Paris.

LONDON:
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Recent Patents.

To WILLIAM CHURCH, *late of Nelson Square, Southwark, but now of the Britannia Works, Birmingham, Warwickshire, for an improved Apparatus for Printing, to be used by Type, Block, or Plate Printers.*

[Sealed 18th February, 1823.]

THIS improved apparatus for printing, applies particularly to the printing of calicoes, linens, silks, and other fabrics for dress, furniture, or decoration, and consists of a new method of forming a cylinder of types, blocks, or plates, combined in a peculiar manner, for the composition of designs, patterns, or subjects, to be printed upon such fabric; and also in the mode of applying these cylinders to printing in more than one colour.

The individual types are made convex on their face or outer surface, and concave at their back or inner surface: the curve of the latter must be formed to the periphery of

a solid cylinder, upon which they are to be bedded; that of the former to a segment of the entire cylinder of types, when combined and formed.

Plate IV. shews the manner of constructing this apparatus. Fig. 1. shews a single type or block, viewed edgewise; of these, any required number may be combined to form the cylinder of types, provided that the curved surfaces are shaped, as above said, to the proper radii, and the sides of the types formed of right lines radiating from the centre of the said cylinder. Fig. 2. shews the outer surface or face of a single type, with the figure raised upon it, or a portion of the figure or design which is to be produced by the combination of several types, as seen on the surface of the entire cylinder. Fig. 3. represents the solid cylinder of iron, round the periphery of which the types are mounted, as at *a a*. Fig. 4. is an end view or section of the cylinder, shewing the manner in which the types stand radiantly round it. A nick or groove, formed to the segment of a circle, is made in the flat sides of each of the types, for the purpose of receiving a ring, which, by falling into the groove, holds each circle of types securely together, and the outer moveable collet *b*, with its cap, is screwed up against the last circle of types, when the cylinder is filled, in order to make them all fast. Several of these types or blocks, with a pattern or portion of a pattern raised upon each of their faces, being combined in the manner above described, upon a solid cylinder, are designed collectively to produce an entire subject, or a series of devices, and are employed for printing calicoes, silks, and other fabrics, and also paper for paper hanging, or other purposes, with a similar effect to the wooden or metal blocks usually adopted in surface printing.

The manner in which these cylinders are proposed to be employed for printing in several colours, is shewn at Fig. 5.

which is an end view of a machine, with its appendages, (the frame-work being omitted) exhibiting the manner of arranging the printing cylinders round what is usually called the pressing cylinder, and in which also is seen the fabric distended while printing, and a series of heating tubes, for the purpose of drying the goods between the impressions.

a a, is a large cylinder, answering the object of a pressing cylinder; *b b b*, are three printing cylinders, constructed as above described; these are to be placed at convenient distances from each other, round the large cylinder, with weighted levers applied to their axles, in order to produce the necessary pressure. The axles of the printing cylinders are placed in the frame-work, which supports them in such a manner as will permit their being shifted to any required distance apart, for the purpose of effecting the register of the different colours of the pattern with perfect accuracy; *c c c, &c.* are a series of hollow cylindrical tubes, heated within, by steam or hot air, which passes through the hollow pivots and corresponding channels in the frame-work from one to another. These cylinders are placed near to the fabric, for the purpose of drying the ink deposited by one printing cylinder, before it comes under the operation of the next printing cylinder. They are placed in the frame-work, and made to revolve upon their axles by means of bands and pulleys communicating with a moving power, or by any other convenient mode.

On the outer periphery of the heating cylinders, there are radiating fans, as shewn by dots; the object of which is to circulate the heated air, and between each two cylinders, there is a curved partition *d d d*, for more effectually conducting the damp from the fabric during the operation.

The cloth or other material intended to be printed, is first to be wound upon the roller, *e*, and being attached to a constant piece, brought over the pressing cylinder from

the receiving-roller *f*, is, when the apparatus is put in motion, conducted in the direction of the arrow between the several printing cylinders and the pressing cylinder, and is ultimately received on the roller, *f*. The tension of the cloth is effected by a friction lever *g*, applied to a pulley upon the axle of the roller *e*; and a band, extending from a pulley *h*, upon the axle of the main cylinder, to a roller *i*, upon which the receiving cylinder rests, which causes the roller *i*, to revolve with a velocity somewhat greater than the progress of the cloth, and thereby effects its required tension. *k k k*, represent the situations of the rollers which supply the ink or colouring matter to the printing cylinders, but as the contrivance of an inking apparatus is not claimed as new, it has not been thought necessary to represent its parts in detail. The same reason has induced the patentee to omit the frame-work, and also to avoid describing any mode of applying power to give motion to the machinery, confining, as he says, his claim of invention simply to the two following particulars;—"First, the construction of the printing cylinders, by means of types, blocks, or plates, combined together, as above described; and Secondly, to the introduction of an apparatus for drying the print, between the application of the several colours."

[*Inrolled, August*, 1823.]

To James Frost, *of Finchley, Middlesex, Builder, for certain Improvements in the process of Calcining and Preparing Calcareous and other Substances, for the purposes of forming Cement.*

[Sealed, 3d April, 1823.]

The proposed improvements in the process of calcination, consists in certain methods of cooling the substances

from the kiln, without permitting the atmospheric air to act upon them. Calcareous substances, or any natural or artificial admixture of them with earths or oxides, suitable for the production of cements, may be advantageously treated by preventing any access of the external air or moisture. To effect this object, the materials are to be introduced into reverberating furnaces or kilns, heated to a proper degree, which will generally depend upon the nature of the substances acted upon. The purest calcareous matters require the greatest heat, in general, to calcine them; a combination of other substances may be calcined at a lower temperature. The apertures of the furnaces or kilns, containing the materials, are to be closed and luted until they have become cold, when the calcined substances may be removed, or the hot materials may be withdrawn from the furnace or kiln, through suitable apertures in the floor, or elsewhere, (such apertures being kept closed during the process of calcination) into an iron cylinder, connected to the furnace or kiln, and made perfectly impervious to air or moisture. In such cylinders the calcined substances are to remain until cold, and a second quantity of materials may, in the meantime, be undergoing the process within the furnace.

Such mixtures of calcareous and other earth or oxides as can be sufficiently calcined at a bright red heat, are proposed to be operated upon in tight iron cylinders or retorts, heated in proper furnaces, and the cylinders having safety-valves opening outwards, to emit the vapours while heating, and exclude the atmospheric air while cooling. These cylinders are to be suffered to become cold before the materials are withdrawn, or other cylinders may be attached to the ends of these, into which the hot calcined matters can be transferred, without admitting the atmospheric air or moisture, while cooling; the passage between them being closed, another portion may be subjected to the calcining process.

The cylinders employed for cooling, should have narrow door ways, and these perfectly closed and luted; and it may be found desirable to inclose them in other larger cylinders, for the purpose of introducing water into the space between the two, to facilitate the cooling process of the material contained in the inner vessel; in this case, the heat communicated to the water may be advantageously employed for useful purposes.

These furnaces or kilns must be furnished with proper apparatus for charging them, and for stirring and withdrawing the substances submitted to calcination; and these substances may be either in a pulverized or concrete state.

The patentee declares his invention to consist in "combining calcareous substances or materials, or artificial admixtures thereof, with other earths or oxides that are useful for the purpose of forming cement, in such manner that they may be cooled previous to any access of the external atmospheric air, or of moisture."

[*Inrolled, October,* 1823.]

To George Emanuel Harpur, *and* Benjamin Baylis, *both of Weedon in the County of Northampton, Engineers, for an Invention of a new Method of impelling Machinery.*

[Sealed, 18th March, 1823.]

This patent is founded upon the old fallacious principle of an overshot water-wheel, when put in operation, being enabled to work pumps, which shall not only raise a sufficient supply of water to keep itself in action, but also give a considerable surplus of power, capable of being applied to actuate other machinery. The inventors, aware of the

defects which similar plans have hitherto possessed, propose to gain an increase of leverage, and consequently power at the pumps, by a peculiar rocking or vibrating motion of the fulcrum.

Plate IV. Fig. 6. shews the general arrangement of the machinery, consisting of certain spur wheels, pinions, levers, fly-wheels, connecting-rods, and pumps, and the mode of actuating them, by the revolution of the bucket-wheel, for the purpose of effecting the mechanical power contemplated: *a*, is a reservoir of water, that may be supposed to contain about three tons, which would be necessary if the diameter of the great wheel was twenty feet; *b b*, are two pumps, the rods *c c*, of which, are worked by means of the leverage obtained by mechanism above; *d*, is a cistern intended to receive the water delivered from the pumps by the small lateral pipes *e e*, from the bottom of which cistern the water flows through a valve on to the periphery of the bucket wheel.

In order to put this machinery in motion, the reservoir *a*, and the upper cistern *d*, must be first filled with water, and also the pumps, when the whole is ready for action. On opening a valve in the bottom of the cistern *d*, the water will flow into the buckets on the descending side of the wheel, and the increase of weight thus thrown on that side of its periphery will cause it to gravitate. This is the principle upon which overshot or bucket-wheels are carried round, and a rotatory or mechanical power given to their axles. On the shaft of this large wheel, a toothed-wheel *f*, is fixed, which turns a pinion *g*; to the axle of this pinion, another toothed-wheel *h*, is attached, which actuates two pinions, *i* and *k*, upon the shafts of the two fly-wheels *l* and *m*.

By this train, the two fly-wheels are made to revolve with great velocity, and to regulate the motions of the machi-

nery.—*n n* are two sweep rods, respectively connected by a joint to the fly-wheels *l* or *m*; the lower ends of these rods are jointed to the levers *o o*, which vibrate upon fulcrum pins or pivots *p p*. At the reverse ends of these levers, the two start rods *q q*, are respectively attached by joints, and the upper ends of these start rods are also attached by joints to the top lever *r*; thus, by the revolution of the large water wheel, all these levers are put in motion.

In order to produce a sufficient stroke of the pump-rods, it is necessary that the lever *r*, should traverse as well as vibrate; this is effected by fixing the lever to the roller *s*, and causing the roller to traverse over a curved bearing or bed *t*. To the pump-rods *c c*, the chains *u u*, are attached, which pass over anti-friction rollers *w w*, and round the roller *s*, to which their extremities are confined. A portion of the roller *s*, and also of the bed *t*, has teeth for the purpose of preventing the roller from slipping, as it traverses; and its action is guided by the lateral arms *v*, attached to its axle. Thus, by the action of the lever *r*, moved as above described by the fly-wheels, the pump-rods are alternately raised, and if the gravity of the rods be not sufficient to depress them again, the lever striking against their crutched heads will force them down.

[*Inrolled, September*, 1823.]

To James Spriggs, *the Elder, of Birmingham, in the County of Warwick, Fender Maker, for his Invention of a certain Improvement in the Manufacture of Grates, Fenders, and Fire-iron Rests.*

[Sealed 11th September, 1823.]

The improvement herein proposed, consists in the employment of a process, technically called *Close Plating,*

which is to be applied to the manufacture of grates, fenders, and fire-iron rests, for the purpose of ornamenting them. The process of close plating is described as being performed "with rolled silver, soldered upon iron or steel, (previously tinned) by means of an alloy of tin with lead or other fit and proper metal, to make it flow the better when in fusion, to produce a more perfect adhesion of the iron or steel to the silver." These are the whole of the instructions given in the specification. The close plating is considered as applicable to beads, pateras mouldings, concaves, convexes, stripes, and other decorative parts of stoves, fenders, and fire-iron rests; also to the feet or balls used to support fenders.

[*Inrolled, November,* 1823.]

To JOSEPH BOWER, *of Hunslet, in the Parish of Leeds, in the County of York, Oil and Vitriol Manufacturer, and* JOHN BLAND, *of the same place, Steam-Engine Manufacturer, for their Invention of certain Improvements in such Steam-Engines as condense out of the Cylinder, by which Improvement or Invention, the air-pump is rendered unnecessary.*

[Sealed 31st July, 1823.]

THIS is an apparatus designed to effect the continual condensation of steam, as it is emitted from the eduction-pipe of an engine, by the uninterrupted flow of a stream of cold water into the condenser, which is supplied and discharged upno the principle of the syphon. By this contrivance, the air-pump, heretofore employed for the purpose of exhausting the condenser, is rendered unnecessary, as a vacuum sufficiently perfect is effected by the means herein proposed.

Plate V. Fig. 6, represents a perpendicular section of the apparatus, by which its internal construction may be seen. *a*, is a cistern nearly filled with cold water, which may be supplied from a reservoir at any convenient distance; *b*, is a tube rising from the cistern, and proceeding to the chamber *c c*. Within this chamber is the vessel *d*, open at the top, and from the lower part of this vessel, a pipe *e*, proceeds down to the well *f*, considerably below the cistern. This pipe *e*, has a valve at bottom, opening outwards, and an enlarged part, just below the cistern, with a branch *g*, forming a communication between the cistern and the pipe; *h*, is a bent tube, which is the eduction-passage leading from the working cylinder of the steam-engine.

When the engine is about to be set to work, the stop-cock at the bottom of the pipe *b*, is to be opened, and also the communication from the working cylinder to the tube *h*; the steam will by these means be enabled to blow through the apparatus, out at the cock of the pipe *b*, and through the valve at the bottom of the pipe *e*. The steam is then shut off, and the cock at *g*, opened, by which cold water from the cistern will flow into the bulb of the pipe *e*, and there coming in contact with the steam, will cause an instantaneous condensation to take place, and produce a partial vacuum in the apparatus. The cock *g*, must now be closed, when the water will rise in the pipe *b*, from the cistern *a*, filling the chamber *c c*, and by flowing over the top of the vessel *d*, will descend in that vessel, and pass down the pipe *e*, and out at the valve at bottom. By these means a syphon is formed, and the cold water will continue to flow through the apparatus, keeping the internal vessel *d*, sufficiently cool to cause a continual condensation of the steam emitted into it, though the eduction pipe *h*, and produce a lasting vacuum, sufficiently perfect for the purposes of working the engine.

The supply of cold water required for the purpose of keeping up the condensation, is to be regulated by the opening of the cock at bottom of the pipe *b*, and this quantity may be readily ascertained by plunging a thermometer into the water in the well, or waste cistern at bottom of the pipe *e*, as the temperature there indicated will show whether the supply of cold water is too much or too little for the purpose.

When the supply-water is stationed above the apparatus, it may be admitted into the chamber *c*, by a pipe *i*, as shewn by dots instead of the shorter leg of the syphon *b*, and flowing thence through the vessel *d*, will descend to the well which should always be about thirty-four feet long from the top of the vessel *d*, to the surface of the water in the well. It is also to be observed, that the top of the vessel *d*, may be closed, and perforations made through it, or a grating put over for the water to pass, instead of flowing over the top edge of the vessel, as shewn in the figure.

All the varied constructions of this apparatus, if they embrace the principle of a syphon for the supply of the external chamber, by which the cold water may flow round and over the upper edges of the internal condensing vessel, or introduce the eduction-pipe in the manner described, or the waste pipe of such length as shall contain a column of water, below the condensing chamber, sufficient to counterpoise the pressure of the atmosphere, will be considered as mere modifications of the above apparatus, and embraced under the present patent.

[*Inrolled, September*, 1823.]

To HENRY HABBERLY PRICE, *of Neath Abbey, in the County of Glamorgan, Engineer, for his Invention of an Apparatus for giving increased Effect to Paddles used in Steam-Vessels, applicable to rotatory Movement, by which they are generally worked.*

[Sealed, 18th March, 1823.]

THIS apparatus is designed to produce occasionally, an increased power of the revolving paddle-wheels, which is considered to be desirable under particular circumstances, such as "going head to wind, or in a heavy sea, or in towing vessels, and other causes;" for it frequently happens under these circumstances, that the steam-engines applied to actuate the paddle-wheels, are in some measure overpowered by the sea, and the progress of the vessel, thereby impeded. The object of this invention (which is called an *accelerator*) is to enable the engineer occasionally to produce a greater power of the wheels, for the purpose of accelerating the progress of the vessel through the water; the construction of which apparatus is shewn in Plate V. at Figs 3 and 4.

Fig. 3 is a side view of the accelerator, and Fig. 4 a front view of the same: *a*, is a shaft; *b*, a toothed-wheel, affixed to this shaft, which, in the ordinary action of the paddle-wheels, when the accelerator is not brought into use, is connected by a pin (shewn detached at Fig. 5) to the cog-wheel *d*, and this being affixed to the paddle-wheel shaft *e*, and worked by the sweep-rod of the engine, causes the paddle to revolve with the same velocity as the shaft *a*.

But when the increased power of the paddle-wheels becomes necessary, then the crank pin, Fig. 5, which couples the wheels *b* and *d*, is removed, and a stud, as *c*, introduced

into the wheel *b*, as shewn in the figure. The levers *f*, are then depressed, which turn the pinions *g*, and cause the racks *h*, to slide up, and with them the carriage *i*, of the accelerator. By this means the toothed-wheel *k*, is brought into geer with *b*, and the toothed-wheel *l*, with *d*; a wedge is now let fall into the recess *j*, which prevents the rack and carriage from sliding back again.

It will now be seen that by coupling the sweep-rod of the engine to the stud *c*, the shaft *a*, and its wheel *b*, will be alone actuated: *b*, however, thus becoming a spur-wheel, turns the toothed-wheel *k*, which is larger in diameter than *b*; and the shaft *m*, to which it is affixed, carrying the toothed-wheel *l*, causes that also to act as a spur-wheel to turn the wheel *d*, affixed to the paddle-shaft. Thus the different diameters of the toothed-wheels *b*, *k*, *l*, and *d*, which are combined, and act simultaneously, give an increased power to the paddle-wheel shaft *e*, at the end of the train, while the rotation of the shaft and wheel *a* and *b*, and the action of the engine remains the same as before the accelerator was connected to it: the sweep-rod of the engine being thus attached to the wheel *b*, will be enabled to exert a greater power over the paddle-wheels; and if the toothed-wheels are properly proportioned to each other, the engine may in any weather make its full complement of strokes per minute.

Whenever a change of circumstances render it desirable to return to the ordinary method of propelling, the stud *c*, must be removed, and the coupling pin, Fig. 5, introduced and bolted to the two wheels *b* and *d*; the accelerating apparatus must be also withdrawn, by raising the levers *f*, which by means of the pinion and rack *g* and *h*, cause the carriage *i*, to slide back, and draw the wheels *k* and *l*, out of geer with the wheel *b* and *d*. The pin, Fig. 5, will then,

by uniting the two wheels, convert them into a crank which turns the shafts *a* and *e* with the same velocity and power.

The patentee states, that the same object may be effected in other ways, but that he prefers the mode described above: he "does not however confine himself to this particular application of the principle," but declares his patent to be "for an apparatus which" he "may apply to the paddle-wheels or other propelling machinery of steam-boats or vessels, or remove at pleasure; the shaft or axis of such paddle-wheels remaining always in the same line and direction as the shaft or axis to which the steam-engine or engines may be attached, thus affording the means of applying the engines directly to the paddle-wheels in the ordinary way, while the accelerating apparatus remains at rest, or by the application of the said apparatus, whenever that may be more desirable to effect the object in view."

[*Inrolled, September,* 1822.]

To Thomas Barnard William Dudley, *of King-street, in the Parish of St. Anne, Westminster, in the County of Middlesex, Mechanist, for a method of making or manufacturing malleable Cast Metal Shoes for draft and riding Horses, and other Animals, upon a new and improved plan or principle.*

[Sealed, 16th December, 1822.]

The patentee considers that horse-shoes made hollow on the under side and regularly shaped, upon the principle described in a work lately published on the veterinary art, by

J. Goodwin, Esq. one of His Majesty's equerries, are preferable to any other kind of horse-shoes heretofore invented; but it having been found impracticable to make shoes perfectly uniform in shape by the old mode of hammering them out of malleable iron, he proposes to make shoes of the form above alluded to, by casting them in moulds from regular patterns, and afterwards annealing them in suitable furnaces.

These shoes are to be cast with the best charcoal pig-iron, from patterns of various sizes, suited to the feet of every description of horse, advancing progressively from the smallest size to the largest: the forms of which are shewn in Plate V. Figs. 5 and 6, the former being a representation of the under side of the shoe, the latter a section cut through it cross-ways. These cast-iron shoes are to be decarbonized, by submitting them to a red heat, in closed vessels, surrounding the shoes with such substances as have a great affinity for carbon, viz. iron filings, or scales, from the forge, &c.; but this process of decarbonizing cast-iron for the purpose of rendering it less brittle, is well understood.

The improvement, as to form, is in the introduction of a cord, or rising bead, on the under part of the shoe next the inner edge, for the purpose of preventing the access of dirt and stones between the shoe and the hoof. Shoes made in this manner may, when a pattern of a certain Number, as 1, 2, 3, &c. has been selected, suited to the feet of a particular horse, be supplied in any quantity, all exactly alike in form and size,—a convenience which would preclude the possibility of the horse being injured, as frequently happens by attaching wrought-iron shoes of irregular sizes which do not fit his hoof.

The patentee does not claim any improvement in the

mode of casting these shoes, or in the process of decarbonizing iron, but rests his claim of invention, first, in rendering such horse-shoes malleable as have been produced from iron by casting; and secondly, in forming the cord or bead round the inner part of the shoe as above described for the purpose there stated.

[*Inrolled, June*, 1823.]

To John Jackson, *of the Town of Nottingham, Gunmaker, for his Invention of certain Improvements in the Construction of Locks used for the Discharge of Guns and other Fire-arms, upon the Detonating principle.*

[Sealed 29th July, 1823.]

These improvements apply to a self-priming magazine-lock, and consist of a roller-piece, which turns round between the magazine, or priming-chamber, and the touch-hole, for the purpose of conducting a small portion of the detonating powder from the magazine to the touch-hole.

Plate V. Fig. 7, shews a lock upon this improved construction: *a*, the cock, is here shewn in the position of half-cock, the dotted lines representing the same when discharged. Fig. 8, is a section of the cock by which its internal conformation will be seen: *b*, is the magazine or chamber containing the priming-powder, which having been introduced, is closed in by the cap *c*, and a small piece of cork is placed in the top, intended to blow out in the event of an accidental explosion; *d*, is the roller-piece, in the side of which a small hole or recess is placed for the purpose of taking up a small

portion of the priming-powder. This roller-piece *d*, is turned round by a lever *e*, so as to bring the priming-hole near to the aperture *f*, in front of the cock. The lever *e*, of the roller is to be moved by the finger of the sportsman (when preparing to fire) into the position shewn in Fig. 7, and a small spring-catch, on the back of the lever, falling into a notch, holds it in that situation. When the cock is discharged, the lever *e*, strikes against a friction-roller *g*, which forces the spring-catch out of its notch, and carries the roller-piece round a little farther, so as to bring the prime-hole exactly opposite to the aperture *f*. By this means the nipple *h*, fixed in the breach, is enabled to enter the prime-hole, and when the cock comes down, the percussion of the powder causes it to explode.

There is a proposition for working the roller-piece by means of a small arm connected to the lock-plate and to the lever *e*, by which the roller *d*, is turned round to the priming position as the cock comes down, instead of moving the lever by hand as above described.

The different parts and pieces of the lock are not claimed as new in themselves, the invention being limited to the *roller-piece*, for the purpose of conducting the priming as above-described, which is considered to be a more eligible mode of constructing a self-priming gun-lock, and more safe and free from the danger of exploding than any other self-priming magazine-lock heretofore used

[*Inrolled, September*, 1826.]

To BENNINGTON GILL, *of Birmingham, in the County of Warwick, Merchant, (in consequence of a Communication made to him by certain Foreigners residing Abroad,) for certain Improvements in the Construction of Saws, Cleavers, Straw Knives, and all kinds of Implements that require or admit of Metallic Backs.*

[Sealed July 15, 1823.]

THESE improvements on saws, and other cutting tools requiring metallic backs, consist of a particular mode of constructing these metallic backs, and of attaching them to the blades, and also of connecting these and the handles together. The improvement, as appertaining to saws which have thick metal backs, is first described. The blades of these are formed out of rolled steel, to the size required, and are cut into teeth in the way that saw-blades are usually made. Plate V. Fig. 9, shews one of these saws, the back and handle being cut through in section, to shew the mode of connection.

The backs to be attached to the saws are made cylindrical, or nearly so, and formed out of rolled plate-metal;—either brass or iron is proposed. The plates of brass or iron are to be cut into strips of suitable lengths, and of about one inch and three-eighths wide,—the edges being made perfectly parallel. The strips are then bent up round a cylindrical rod, and passed through a draw-plate, in the manner of drawing telescope-tubes. The tube thus formed is a hollow cylinder, smooth on the outside, with a straight cut from end to end, where the edges of the metal meet; this cut is for the purpose of introducing the thin back part of the saw blade. The handles of these saws are made much in the usual shape; the mode of con-

necting them to the back and blade, is by boring the handle, and passing a portion of the cylindrical back into it, as shewn in Fig. 9.

In order to fasten the blade to the back, and the back to the handle, (all the parts being neatly fitted) the saw is put into sand, and a hole made in the sand, as a gutter, leading to the back part of the perforated handle. Melted lead, or a mixture of lead, regulus, and tin, is then poured in, which, by flowing through the hollow handle and cylindrical back, so as to fill them, and through the apertures of the blade, fixes the back of the blade and the handle together. This mode of attaching the back and blade of a saw is considered to be particularly calculated for warm climates, where the shrinking of the wood frequently loosens the handle; and by this mode of attachment, the heat of the climate can in no degree affect its stability.

If it should be thought desirable occasionally to withdraw the blade and back from the handle, for the greater convenience of sharpening it, then the blade may be secured to the back by melted metal, as above, but attached to the handle by screws, much in the usual way. Or if it should be wished to render the blades capable of being removed from the backs, for the purpose of straightening them, then it is proposed to make the blades as above, and merely introduce their back edges into the cylinders, without fastening them. In this case, the backs are proposed to be made of plate-iron, coated with thin brass,—the edges of the latter being turned in; and the pressure of the metal against the steel blade is found sufficient to hold the blade without any other fastening.

The improvement, as it applies to cleavers, is very much like the preceding. The blade is to be formed of rolled sheet-steel, cut into a proper shape, with holes pierced through at the back, as in the saw-blades. A cleaver, with

its back and handle, is shewn in section, at Fig. 10. The tube for the back is to be formed as before described, and the blade introduced between the edges of the tube; it is then to be driven into the perforated handle, and a wire with an eye at the end is passed down; after these are adjusted, melted metal is to be poured into the tube and handle, as before; by which means the whole is made fast together.

The same contrivances are applicable to the manufacture of straw-knives, hay-knives, and other cutting instruments of that description. Razors may with considerable advantage be made upon this plan, as the strong metallic back attached to a thin blade of steel, by means of melted metal, in the manner above described, will afford an opportunity of using thin rolled steel for the blade of the razor, which by its equality of substance will admit of a uniform temper throughout.

The patentee states, in conclusion, that the improvements claimed under this patent are, "the adaptation of the hollow back to cutting instruments, in the manner and for the purposes above stated, and the new mode of fixing them to the blades and handles, by means of melted metal, when such attachment should be required."

[*Inrolled January*, 1824.]

To JOSEPH WOOLLAMS *of the City of Wells in the County of Somerset, Land Agent, for certain Improvements in Wheeled Carriages of various Descriptions to counteract the Falling and Facilitate the Labour of Animals attached to them, and to render Persons and Property in and near them more secure from Injury.*

[Sealed 5th December, 1822.]

THESE improvements apply to two-wheeled carriages, and are described under eight heads, the first of which

appears to be merely the introduction of joints in the shafts, for the purpose of allowing them to descend without tilting the body of the carriage forward when the horses happen to fall; secondly, the application of a safety-bar or prop to the front part of the carriage; thirdly, a clasp or locking apparatus to hold fast the joints of the shafts; fourthly, is a means of retarding the descent of the shafts so as to keep the horse upon his legs; fifthly, a sliding frame or rail connected with the shafts, which, sixthly, may rise or fall according to the motions of the horse, without carrying the body of the vehicle out of its horizontal situation; seventhly, an apparatus for enabling carts to be tilted backwards to discharge their loads; and eighthly, a mode for adjusting the beds of carts so as to relieve the draft.

Plate V, Fig. 1, represents a gig with the jointed shaft mentioned under the first head. The dotted lines shew the front part of the shaft extended forward as it would appear if the carriage was going; *a*, is that part of the shaft which descends when the horse happens to fall; *b*, is the hinder part of the shafts to which the body and wheels are fixed; *c*, is the joint where the fore-part of the shaft is enabled to turn downwards; but when the carriage is travelling forward it becomes necessary to keep the joint fast, that the fore and hind parts of the shaft may act as one entire piece; to effect which a clasp or locking apparatus (mentioned as the third head) is attached to the two parts of the shaft. These consist of a pin falling into a notch in the joint, which holds the joint firmly closed until the pin is pushed up out of the notch. The second head of the invention is the mode of raising this pin, which is effected by a safety-bar *d*, having at its lower part the prop-wheel *e*. When the horse falls the wheels *e*, come in contact with the ground, and the safety-bar *d*, being attached above to a lever extending across the carriage, the bar is enabled to rise, and

to lift the pin out of the notch, when the fore-part of the shaft falls down from the joint, as shewn in the figure.

The fourth head is a contrivance for checking the fall of the horse, which is effected by springs consisting of two flat pieces of steel being over the joint at *c*. The strength of these springs is intended to keep the joint from opening when the catch-pin is withdrawn, by which means, though the horse falls sufficiently for to bring the prop-wheel to the ground, he is checked by these springs upon the shaft; but if unable to recover himself, then his weight will overcome the springs, and the joint opens so as to permit the fore parts of the shafts to descend without tilting the body of the gig out of its horizontal position.

The fifth head of the invention, is attaching the fore-part of the body of the carriage to the shafts, by means of rest-irons with gudgeons which pass through elongated holes in plates affixed to the shafts, which is a contrivance to prevent the vibratory motion of the fore-part of the shafts being communicated to the body of the vehicle. And sixthly, as the fore-parts of the shafts rise and fall by the action of the horse, the gudgeons of the rest-iron slide backward and forward in the elongated holes of the plate; the hinder parts of the shafts are of course enabled to rise and fall also, and are connected to the back of the body by springs.

Fig. 2, shews the seventh head of the invention, which is a cart with a new contrivance for tilting it backwards, for the purpose of discharging its load behind. The shaft of the cart is in two parts, *a* and *b*, united by a hinge or joint *c*. There is a lever *d*, which holds the two parts securely together by means of the curved part at *e*, pressing against a pin and a hook *f*, that the longer arm of the lever is confined by. In order to tilt the cart, the longer arm of the lever is withdrawn from the hook *f*, and then raised

upwards, which relieves the pin at *e*. The cart may now be tilted back upon the hinge or joint *c*, and kept in an elevated situation by introducing a pin into one of the holes of the sword *g*, so as to stop it against the shaft, which will poise the load in going down hills. This cart may have also the safety bar and prop wheel in the manner before described, for the purpose of permitting the descent of the shafts if the horse should fall while the body of the cart is enabled to remain nearly in a horizontal position. The eighth head of the invention is the application of the sliding apparatus, described under the fifth head, to the relief of the draft, preventing the jolting of the body, and thereby equalising the weight at all times upon the horse's back.

Inrolled, June, 1823.

Original Communications.

DR. WILKINSON *on the Causes of the Inundations to which Bath and its vicinity have lately been subjected: with Remarks on Springs, particularly those from whence the Warm Waters of Bath arise; which Papers being read before the Annual Meeting of the Bath and West of England Society for the Encouragement of Arts, obtained the Bedford Silver Medal.*

(Communicated by the Author.)

THE formation of rivers depends on two principles—the elevation of the spring from whence they originate, and the condition of the ground over which they pass. If the earth had been perfectly spherical, if its surface had been

uniformly smooth, and if its motions had been confined to its annual and diurnal revolutions, we should not have known any thing of springs or rivers, nor have experienced the advantages of the flux and reflux of the ocean. The irregular form of our earth, not reducible to any known figure, not any figure of revolution, its surface varying in elevations and depressions, and the perpetual change of action in the fluid part of our globe, by the third motion of the earth, are those admirable provisions effected by Divine Wisdom for the support of the animated part of creation.

Professor Buckland, in his admirable geological memoir, thus observes:—"In the whole machinery of springs and rivers, and the apparatus that is kept in motion for their duration, through the instrumentality of a system of curiously constructed hills and valleys, receiving their supply occasionally from the rains of heaven, and treasuring it up in their everlasting store-houses, to be dispensed perpetually by thousands of never-failing fountains; we see a provision not less striking, or less important. So also in the adjustment of the relative quantities of sea and land, in such due proportions as to supply the earth by constant evaporation, without diminishing the water of the ocean; and in the appointment of the atmosphere to be the vehicle of this wonderful and increasing circulation." To these admirable observations we may add, that mountains are not to be considered as casual elevations, the results of fortuitous circumstances. Each mountain is the source of a spring, whose extent is in proportion to the elevation and range of the mountain from whence it emanates; thus the largest rivers and the most extensive lakes are formed in mountainous districts; as the river La Plata from the Andes, and the lakes in Switzerland from the Alpine Range. The sides and the tops of mountains are colder than a corresponding atmospheric elevation: this arises from the radiation of calo-

ric occasioning a continual ascending current of air; the diminution of temperature necessarily producing a condensation of atmospheric vapour, which is one important source of springs.

Another great supply to our rivers arises from the stratified inclinations of those beds which constitute the known external crust of our globe; had no other power in their formation but that of gravitation acted, the strata would have been formed into concentric layers, and would have excluded from us that variety of useful minerals, almost indispensable to the existence of man in a state of civil society. Those disturbing forces, which are the result of the triple motion of the globe, during the period of consolidation of the earthy materials, have produced a varying inclination to the plane of the horizon, so that a variety of mineral productions are made to emerge in succession on the surface of the earth. Had it not been for this admirable arrangement, we should not have known any thing of coal, of iron, and of all the treasures of the metallic world; or in this city have been favoured with those warm springs, which are the happy source of relief in so many corporeal afflictions.

Anterior to Mr. Boyle, it was imagined that the higher we ascend, the warmer; correct experiments have ascertained that temperature diminishes in a regular ratio as we ascend, and increases as we descend below the surface of the earth. Thus on the Alps, Saussure found a diminution of one degree of heat for each elevation of 287 feet; at the Azores, Dr. Heberden observed the scale as 1° to each 145 feet; and Dr. Hutton, at Arthur's Seat, near Edinburgh, an elevation of 800 feet, produced a diminution of 3° of heat. When in any particular latitude the law is ascertained as to one degree, the scale of diminution proceeds uniformly as the elevation. So beneath the sur-

face of our globe, when we are lower than that portion which is influenced by seasons, those portions have a constant uniform temperature: thus the generality of springs, denominated cold, are about 50° temperature, therefore comparatively warm in winter, and cold in summer. De Luc, in the copper mine at Hartz, at 1359 feet of depth, found the temperature at 70°, when on the surface it did not exceed 60°; and in the Arctic Circle, Van Swinden found at the depth of 40 feet the temperature 54°, while the surface was 32°. In an analysis of the Bath Waters, which I published in 1811, I attributed the warmth of these springs to the depth from which they were determined; thus ascribing it to a cause which must remain invariably the same, as long as the same structure in that part of the earth continues. Had the temperature depended on the developement of caloric from any of the beds over which it flowed, in the course of ages the source would have varied, and changes would have been produced; which have not been observed. Had the caloric been unfolded by the decomposition of pyritical matter, some combinations of the elementary principles would have been evinced in the waters, but which the most delicate chemical tests cannot detect. In the introduction to the valuable outlines of the geology of England and Wales, by Messrs. Conybeare and Phillips, it is stated by the former excellent geologist, who is the writer of that part, "From the experiments of Messrs. Fourrier and Fox, relative to the mines in Cornwall, it appears that there is a regular gradation of increased temperature in every successful level." At the period I was arranging my observations on the Bath Waters, I requested my friend Mr. R. Fox, of Falmouth, to ascertain by experiments the condition of the different mines as to temperature, particularly the mine of Dolcoath, which, from its extent and depth, would be very favourable for such an ex-

amination. The letter he favoured me with did not arrive previous to the period of publication, otherwise I should have availed myself of that confirmation of my opinion which so highly respectable an authority would have given.

Each mountain being thus considered as the *punctum saliens* of one or more springs, these uniting in the lower plains would form rivers, moving in that direction where they experience the least resistance, carrying along, not in solution, but in mechanical admixture, sand, shingle, clay, and other materials corresponding to the ground over which they have flowed; and cover the lower districts with alluvial depositions. Thus, with respect to the river Avon, the bottom and the surrounding soil would be simultaneously raised by the deposit of those substances which the Avon has brought from the higher grounds. This work of nature has been accelerated by art, the inhabitants, to protect themselves from these encroachments, have brought new accessions of soil to the grounds which they occupied. The materials by which these elevations have been effected, correspond with the constituent parts of the higher grounds through which the Avon has been determined, and cover the lower parts of Bath several feet with what is termed *made ground;* and from the same source arises the siliceous sand which lies on the beds of the warm baths, containing magnetic iron, and occasionally some nuts and bones. These have been erroneously imagined to have originated with the warm spring, from some remote source, and to have been determined here by the agency of the spring. The sand is precisely the same with that found on the banks of the Avon, deposited there from the washing down of chalk hills some miles above Bath, and which contains similar magnetic iron in the form of pyrites. Common pyrites, or sulphuret of iron, has 46 per cent. sulphur; when exposed to a common

culinary fire, the proportion of sulphur is reduced to 35 per cent, which marks the proportion in the sulphuret, and hence it is supposed by chemists that the excess is in a state of sulphur not in chemical combination with the iron, and capable of being detached either by the agency of moderate heat, or in its granulated state by a continued action of water. There is reason to believe that the lower parts of Bath were formerly covered with water, forming an extensive marsh or lake; by a progressive elevation of the ground the waters have been reduced to narrower dimensions, so as to have been ultimately contracted into the channel now constituting the river Avon In proportion as land becomes valuable the waters are prevented spreading by embankments and buildings, and consequently by the depth and velocity become proportionately increased. The Avon evinces the disturbance of the bed by the turbidness of its waters. If the waters descend on rocky grounds which they cannot remove, they rise and spread, and proceed with a diminished velocity towards the lowest point. It has been ascertained by experiments that if the velocity be equal to 34 inches per second, the impetus is sufficient to drive pebbles of the size of a hen's egg; and if so slow as not to exceed 4 inches in the same time, only sand will be moved. From that attrition, the result of this motion, arises the rounded appearance denominated *water-worn*, and all the sharp angles of all siliceous sand are smoothed down, so as no longer to exhibit the figure of an hexagonal pyramid, the form characteristic of a perfect crystal of quartzose sand. On this cause depends the inferiority of river sand to pit sand in the formation of mortar; the firmness of that cement arises from the progressive regeneration of the lime to its original state of limestone, the crystals of which, as they are formed, being strengthened in their aggregation by the support from the

rough sides of the sand; and hence mortar is improved in proportion to the quantity of good sand which can be introduced, viz. about five bushels of sand to one of lime.

If the bed of a river should be of the same uniform materials, and in the same condition as to resistance, the current would be uniform. Thus the fall from Bath to Bristol is about 35 feet, the circuitous course of the river measures nearly 20 miles, which in round numbers may be stated a 12 inch fall for every 1000 yards extent. If the bed of this river were of uniform resisting materials, it is evident that to keep the waters at a level between any two wears, so as to have a fall of five feet, the distance should be 5,000 yards, or near three miles; and from such an arrangement there would be no other current than that which arises from the flow of water over the wear. Between the wear at Pulteney Bridge and the first wear at Tiverton, the distance is two miles and a half as to the river; this wear has a fall of about four feet six inches as to efficient power, a little increase being obtained to overcome the resistance of the tail water, namely, that portion of water in which the water wheel is immersed. About half a mile below is a similar wear with an equal fall, so that in the space of three miles the sum of the two falls equals nine feet; a proof that the bed of the river has been less resisting to the current of water than the remaining portion of bed, or the wear at Pulteney Bridge at a less elevation than it might be. In consequence of the two wears at Tiverton, a navigable cut has been made, leaving an island between the cut and the river, and which is necessarily of such a length as to correspond from the upper part of the first wear, to the lower part of the second wear, forming communications with the river in these parts. Without such a cut the navigation of the river in that part would have been interrupted. The entrance into this cut is by locks, constructed in the usual way, the gates being

12 feet wide, and 9 deep, the depth necessarily corresponding to the sum of the two falls within the range of this cut. In the course of the river there are wears at Saltford, Swinford, Keynsham, and Hanham. Previous to the Bristol Docks being built, at spring tides the mills at Hanham had no tail water, since that period no part of the river is influenced by the tides.

With respect to wears, it has frequently been a subject of dispute, whether such constructions are to be deemed nuisances and improper infringements on a river by the proprietors of lands on the borders, or whether the river is not rendered more navigable by means of such constructions. When the powers of steam were not so well understood as at present, wind and water were the two principal powers of motion then known: it is reasonable to suppose that any advantage of this kind resulting from a constant flow of water, would be appropriated to such a purpose; and in my opinion there is no doubt but that such a river as the Avon would not be navigable, if the waters were not backed by means of wears. Suppose the Avon emptied of its water, so as to expose its bed, it would not be presented to our attention as a regular inclined plane; it would be a series of elevations and depressions, varying according to the greater or less resistance of the ground; if the stream of water were allowed to proceed on such a bed without interruption, instead of a navigable river we should have a chain of ponds, varying in depth, and only connected by dribbling streams. The contraction of the waters into narrower dimensions by means of embankments, and the uniformity of level by the operation of the wears, have been the means of rendering the Avon navigable, and are highly beneficial in the general condition of the river; it is in case of inundations, in those instances where a larger quantity of water is determined from the higher grounds, that these

very circumstances act as obstructing media. The wears are provided with a number of hatches or doors, each being about 6 feet deep and 3 wide, they are raised perpendicularly, and are principally used when any repairs are required in that part of the bed of the river which lies between two wears. In case of inundations, as at present constructed, they are of very little use, for when the elevation of the water is 10 inches above the wear, the opening of the hatches makes no sensible impression on the level; when that level is several feet above the hatches, as these doors are elevated perpendicularly, their resistance would nearly balance the quantity of water determined through the aperture below. I believe this little relief is not often attended to, for it has been generally observed that the hatches are closed in most instances of floods. I have already remarked that the lock gates are constructed in the usual manner, and therefore will not allow of both gates being opened at the same time, which if practicable would afford an extensive outlet. When one side of a gate is exposed to the pressure of water, and there is no counterbalance on the other, that pressure is determined by the universal law of fluids being as the area of the base multiplied into the columnar height; in this instance we take the mean elevation, and the resistance of the water will exceed 13 tons; and even if this pressure could be overcome, the bed of the river would be endangered by the sudden fall of water, 9 feet in height and 12 feet in width.

Although embankments and wears answer the purpose before mentioned, in the construction of such embankments great care should be taken that the width of the river should be preserved uniform, and all the deviations from the right line should be made in the curve of the least resistance; any sudden projecting bank would materially influence the course of the river, and constitute, in high determinations of water,

very serious obstructions. With respect to the Bath river, this variation of width is continually presented to our attention, in some places exceeding 100 feet, and in others not more than 40, and in some instances so suddenly projecting as to alter entirely the motion of the river: this is particularly observable on the Bath side of the river, a little above the Old Bridge; although there are five arches belonging to this bridge, yet the principal determination of water is through the two arches on the Widcombe side of the river. This irregularity in width, and the bad mechanical form of the embankments, are circumstances which I have always considered as materially contributing to those calamities to which the inhabitants of the lower part of Bath have of late been exposed; and they are evils which I presume it would not be difficult to remove. It is evident that a quantity of water moving through a space of 100 feet in width, and subsequently determined through one of 50, that not only a double velocity will be required to counterbalance the reduction of dimensions, but also an additional impetus to overcome the increased resistance, and which, in inundations, will at the commencement operate as a material check, and occasion a proportionately greater elevation. It is evident that from whatever cause the delivery of water is prevented, the inundation must be increased. In the flood in 1809, it was observed that the level of the water above the Old Bridge was 3 feet 3 inches higher than below the bridge, and at the last flood the difference little more, as the elevation, this time, was greater by some inches, than at the period aforementioned. The resistance from a bad constructed bridge is well illustrated by the influence of London Bridge on the motion of the tide; a spring tide moves from the Nore to London Bridge, about 40 miles, in two hours; whilst above bridge, towards Swan Stairs, the velocity is reduced to less than one half. The width of the Thames at

London Bridge, is 900 feet; when the water is above the starlings, the water way is 450 feet, and at low water, when below the starlings, only 194 feet; hence no wonder that the fall is so dangerous, and the cause of so many accidents. At high water, the fall westward is 2 feet, and eastward at low water, sometimes nine feet, so that the starlings check the delivery of water equivalent to seven feet elevation; when the bridge is removed, as is now contemplated, the tide will extend many miles higher than at present. At Westminster Bridge, the width is 1220 feet, and the water way is 870, so that the outlet is sufficient to prevent any fall during any condition of tide.

The Old Bridge at Bath is not precisely in the same condition as London Bridge, although there are four piers in the water, and bad constructed starlings, yet the outlet from the five arches would be sufficient to relieve the river from the inequality of level noticed, if they could be brought into efficient action. In the last flood three circumstances contributed to this difference of height; two arches at the commencement of the swell of water were entirely obstructed by a great quantity of timber, drifted there from the yards on the banks in the neighbourhood, and were completely choaked up. The second cause arose from the contracted state of the river a little above the bridge, and the projecting bank before noticed. The third cause is, that the arches have not sufficient head room, as the elevation of the flood is considerably above the crown of the arches; the arches on each side soon become inefficient, and it is at this period a greater outlet is required. If instead of this bridge, which can no ways be considered an ornament to a city, which in point of beauty is not excelled by any on the globe, an iron bridge with two arches, each about 50 feet span, with the intermediate pier, would suffice for this river, and at every elevation of the water would afford a

considerable outlet; in an iron bridge, the crown of the arch might be within 3 feet at the top, and would in every known flood afford head room, and prevent the previous accumulation of water. The middle arch of Blackfriars Bridge covers a space nearly equal to the width of the Avon at the Old Bridge, being 100 feet span, and 40 feet spring, therefore the curve is elliptical, but not very excentric; the thickness at the top is from 7 to 9 feet, and the thickness of the pier 19 feet, gradually increasing towards the bed of the river. The beautiful iron bridge at Sunderland is a segment of a circle whose diameter is 444 feet, but the measure of the chord is 236 feet, and its spring 34 feet, about double the width of our river, and the thickness of the arch only 5 feet. I understand it is in contemplation to make the Bath Bridge wider, and to take down some houses on the Widcombe side of the river. As an individual having a little interest in the lower town, I would earnestly recommend the erection of a new bridge, instead of attempting any alteration or repairs of the present one. If a meeting of the inhabitants who are interested in the welfare of this city, particularly those who are affected by these floods, should be called by the chief magistrate, to take into consideration the propriety of erecting such a new bridge, I am persuaded that an adequate subscription would be immediately raised for the purpose.

The last cause of these inundations, which I shall now trouble the meeting with, is from rain. The annual quantum of rain which falls in this part of the kingdom averages from 26 to 30 inches by the rain guage, i. e. if all the water could be retained in any given space, without any loss by absorption or by evaporation, it would constitute a sheet of water of that depth. With respect to the rain, as well as every operation of nature, an admirable equilibrium is preserved. The quantum of evaporation in

every latitude nearly corresponds with the quantum of rain, both decreasing as the latitude increases; thus under the line, the rain which falls in one year averages 120 inches; in this kingdom about 30; and at Petersburgh not more than 15; whilst the barometric variation is the reverse. At Jamaica, the mercurial column does not vary one-fifth of an inch; at Naples, 1 inch; at Paris, 2^{1}; England, $2\frac{3}{4}$; and Petersburgh, $3\frac{1}{4}$; being one proof, amongst many others, that the barometer is improperly termed, not being governed by any variation of atmospheric weight, but solely influenced by the agency of two imponderable principles, viz. caloric and electricity. When grounds are covered by houses and pavements, all the rain is generally conveyed into the river by means of sewers or gouts; and in very heavy rains the quantity thus determined is very considerable, and with which every house has a branch of communication. When the sewers are at a lower elevation than the plane of the river, they not only cannot be relieved, but they constitute a medium of communication with the different houses whose levels are unfortunately below the line of flood. In some parts of Lincolnshire and Holland, flood-gates are so constructed as to yield to the greater pressure; hence, in common occurrences, they open to the river; and when the pressure is on the river side, any regurgitation of river water is prevented. I presume there would be no difficulty in contriving a species of floating valve, rising and falling with the plane of the river. Although I have ventured to give an opinion that wears are beneficial in a navigable point of view, yet as they afford material resistance to the flow of water, when they can be dispensed with it is adviseable to remove them; such it appears to me, is the wear at Pulteney-bridge, and which, being so immediately contiguous to Bath, operates as a greater obstruction than all the other wears with respect to this city.

As, however, a wear cannot be removed without a proper indemnity to the proprietor, perhaps, in this instance, the sum required might be too large to admit of its entire destruction being contemplated, yet a material relief would be afforded by a diminution of its fall, and a compensation of power might be effected for the reduction in the size of the water-wheel by an increase in its breadth. In France it is not uncommon for a fall not to exceed two feet, with a water-wheel of little diameter, and of many feet in breadth. As, perhaps, such an alteration might be considered too expensive to be at present adopted, then the relief must depend on properly constructed hatches, by which, I am persuaded, a considerable outlet might be effected.

The quantum of water in our river is greatly increased in time of flood, by its junction with the canal. A canal is supported by the tributary springs which lie in the grounds through which the canal passes. The junction of this canal with the Avon is at Bath, and here is determined all its surplus of water; in such cases, all the locks on the canal should be lowered, and every obstruction removed.

To conclude, I beg leave to submit to the consideration of the public the following propositions, which I flatter myself would, if carried into execution, materially contribute to the comfort and prosperity of the inhabitants of the lower part of Bath and its vicinity.

1. To regulate the embankments so as to preserve as nearly as possible an uniformity of width; and to clear the bed of the river of its deposits of mud.
2. To substitute an iron bridge, with two arches, for the present Old Bridge.
3. To have the apertures in the wears more extensively and efficiently opened.
4. To have the lock-gates so constructed as to be opened without any inconvenience.

5. To adopt floating valves, or some such arrangement, to prevent a regurgitation of sewer water into houses by the excess of river pressure.

I am informed that the Commissioners of Sewers purpose to petition for a new bill; if so, I hope they will have the same powers as the Commissioners of Sewers for Westminster possess. The Commissioners for that city are not only empowered to remove every obstruction to the proper flow of waste water, but can also take cognizance of the condition of the river Thames within their district. If that part of the Avon within the liberties of Bath were to be preserved by embankments of a proper width, the bed of the river occasionally cleansed of the enormous deposits of mud, and the arches of the New Bridge at Newton preserved in proper order, there would be a considerable diminution of resistance: not only the greater part of the outlet of the New Bridge is allowed to be choked by the accumulation of mud, but also great quantities of road dirt are constantly thrown into the river in that part. If the same attention were paid to the conditions of the river, as to its embankments and bed, as have been to the roads in the neighbourhood of Bath, under the superintendence of Mr. Wingrove, many of the calamitous circumstances from the late floods would have been prevented.

I avail myself of this opportunity of suggesting to the inhabitants of Bath, the propriety of holding a meeting, to take into consideration the causes and means of prevention of those serious calamities, the results of inundations. If the sentiments I have thus taken the liberty of submitting to the public, should be found correct, the evils must be increasing, and the recurrence of floods more frequent. If some remedial mode be not adopted, the lower part of Bath will become neglected, and the value of property, in the same proportion, diminished. If by mechanical means relief

can be effected, let men of talents of the country be invited to direct their attention, by liberal premiums, to these important objects; and for such a purpose let an adequate fund be raised. As an humble individual I should experience the highest gratification if, by any exertion of mine, I can in the least contribute to the improvement and prosperity of the city of Bath.

Although this Essay may be considered of a local nature yet I presume that the same principles are applicable to many other districts occasionally liable to inundations.

C. H. WILKINSON.

ON OIL AND COAL GAS.

To the Editor of the London Journal of Arts, &c.

SIR,

I MUST request you to correct a few typographical errors that have crept into my former article on "*Oil and Coal Gas*," published in your last Number.*

In proceeding with the calculations referred to in that paper, it may not, perhaps, be irrelevant to overhaul generally, a few of the leading inducements held out by those who have an interest in promoting the establishment of oil gas companies. They, or rather with a view to give it more effect, their *automatons* represent:—1. That an oil gas work will not cost, in its erection, above two-thirds of a

* In page 34, for 6*l.* per annum for the use of a meter, read 6*s.* In page 35, for *soot* read *foot*. In page 36, for "the ratio of three-fourths," read, "*the ratio of one and three-fourths of oil gas to five of coal gas*;" and in page 37, for "15*l.*," read "15*s. per thousand cubic feet.*"

coal gas work; 2. That the retorts will last longer; 3. That this gas is cheaper to the consumer, and more profitable to the manufacturer, than coal gas; 4. That there is neither residuum, requiring to be carted off, nor offensive odour, emanating from an oil gas station; and, 5. That in burning it is not only entirely free from smell and smoke, but likewise that it cannot injure paintings, polished steel, silks, or gilding, &c.

I shall take the liberty of examining these several pretensions. Firstly, From the nature of oil gas, the first assertion that "*an oil gas work will not cost in its erection above two-thirds of a coal gas work,*" *ought* to be true. The theory, however, which is plausible, happens unfortunately to be at utter variance with practice; but if, for the sake of argument, we were to admit, *en passant,* that an oil gas work would not cost above two-thirds of a coal gas work in erecting, what would the admission prove?—Simply this,—that a man might lay out 8000*l.* *only* in erecting an oil gas work, from which he neither can nor *will* derive even the legal interest of his money, *nor, in fact, any interest whatever*; and he might lay out, on the other hand, as much as 12,000*l.* in erecting a coal gas work, from which, to judge from analogy, he might rationally expect to receive a very handsome annual profit of 7*l.* or 8*l.* per cent. on his capital so invested.

If this be the case, what man of common understanding would hesitate for a moment in choosing between the two?

But that the expence of an oil gas work *is not one-third less* in erecting than a coal gas work, may be easily ascertained, by examining the actual cost of any one of them, compared with that of a coal gas work *of equal capacity.* To take Hull, or Norwich, or Colchester; or rather, to take one nearer at hand, to which reference can be more

easily made, and misrepresentation, if any, more readily detected,—let us take that erected at Bow for example.

By looking at the abstract of the balance-sheet to Christmas, 1822, delivered to several of the shareholders of that concern, at their general half-yearly meeting in February last, it will be found, that under the head of "FIXTURES AND UTENSILS," 7,768*l*. is stated. Let it be remarked, that this sum is exclusive of 2,000*l*. for the buildings. At Bow there is but one gasometer (capable of containing about 8000 cubic feet of gas), and at that time there were only six retorts:—the mains, which are of five, four, three, and two-inch diameters, light, at present, about 320 private and 205 public lamps. Under these circumstances, it would, with great deference, appear, that 7,768*l*. ought fully to have covered, not only the mains, apparatus, and utensils, but also the expences of the buildings, which, on being added to the above 7,768*l*. makes the total expence of erecting those works, 9,768*l*., not to mention 4 or 500*l*. more, not included, for a bench of six retorts that have been since added.

Now, it is maintained, and can be very easily substantiated, if requisite, that a coal gas work, with 18 retorts and 2 gasometers, erected in a scattered village, similar to the cluster of Bow, Old Ford, Bromley, and Stratford, and capable of lighting 900 lamps, instead of 525, on six and a half miles of a continuous main, (the works being in the centre, as at Bow,) and the gasometers in the open air, would not cost more than 10,000*l*., even including the expence of erecting the buildings. The most serious expence in such an undertaking, might appear to be the mains; but it is to be observed, that to supply 900 coal gas lights, at the rate of five cubic feet per hour per light, would not require the mains to be of greater diameter than they are at Bow, of

five, four, three, and two inch diameter. In London, or in any other populous city, however, where six miles of main might have to supply as many thousand lights, it is very true that the expence of the coal gas mains would exceed that of the oil gas mains, in the ratio of the consumption of the two gases, say as $2\frac{6}{7}$, or nearly as three to one.

Secondly, It is next asserted "that the oil gas retorts will last longer than those used for the distillation of coal into gas." But the truth is, that a coal gas retort, properly set, and kept constantly at work, will last, on an average, from eight to twelve months, and sometimes longer; and an oil gas retort, "*set upon their most approved principle,*" will not, under similar circumstances, last above *seven* months!

Thirdly, It is asserted, "that oil gas is cheaper to the consumer, and more profitable to the manufacturer, than coal gas." That this is not the case, with regard to the consumer, has been already distinctly shown in my former paper.

I shall now, on well-established *data*, proceed to examine more minutely the expence to the manufacturer of producing 1000 cubic feet of oil gas. Let us suppose, then, for example, an oil gas work capable of supplying 350 private and 200 public lamps.

Oil gas being invariably sold by meter, the customers do not, therefore, burn it so uniformly as the coal gas customers, to a stated period. They vary in their hours of burning, and in the numbers of their lights, adapted to circumstances. In my former paper it was stated, that if the oil gas customers burnt regularly till nine o'clock in winter, and one-third of the time in summer, 4*l.* 11*s.* 3*d.* would be the rental, and one foot and three-quarters per hour the consumption of gas. But suppose we take one with another, and say, that 4*l.* per annum (exclusive of 6*s.*

per annum, the charge for the use of the meter) were the average rental: in that case, each light would consume 1,600 cubic feet per annum:

So that 1,600 X 350 = . . .	560,000
and 200 street lamps, at 1¾ feet per hour, for 365 nights, averaging 10 hours per night, would amount to 1,277,500 cubic feet: but suppose we were to call the consumption only 1½ feet per hour per lamp, this would amount to . .	1,095,000
Being together	1,655,000

(The oil gas public lamps are generally furnished with small five-jet burners, not giving a light by any means equal to a batswing coal gas burner.)

If we allow one gallon of oil to produce as much as 90 cubic feet on an average, (which, in fact, it will not,) very nearly 73 tuns of oil would be required to produce 1,655,000 cubic feet of gas; and the account would stand thus:

Dr.

	£	s.	d.
To 73 tuns of oil at 20*l.* per tun . . .	£1,460	0	0
(If it were even admitted that 100 cubic feet could be obtained from one gallon of oil, it would still require 65½ tuns of oil to produce 1,655,000 cubic feet of gas, which at 20*l.* per tun, would amount to 1,310*l.*)			
To fuel, salaries, wages, wear and tear, &c.	750	0	0
	2,210	0	0

Cr.

	£	s.	d.
By 350 private lamps, at 4*l.* = 1,400*l.* .			
By 200 public lamps, at 3*l.* 10*s.* = 700*l.*	2,100	0	0
(Public lamps are paid for as high as 6*l.* each, and as low as 10*s.* each: 3*l.* 10*s.* is about the medium.)			
Deficient .	110	0	0

By this statement there appears a deficiency of 110*l.* without paying one farthing of interest on the capital invested.

If the rental is not so much as 2,100*l.* (but only 1,000*l.* or 1,500*l.*) the amount, 1,460*l.* charged for oil, and likewise the expence of fuel, will, of course, be reduced in proportion. The other items, which are calculated on the very lowest scale, will remain pretty much the same.

Hence, in order to estimate the prime cost of manufacturing 1,000 cubic feet of oil gas, we have merely to do this:

To the above annual expenditure of	2,210	0	0
To add 5*l.* per cent. on 8,000*l.* of capital sunk	400	0	0
	2,610	0	0

And this sum being divided by 1,655,000 cubic feet of gas, will leave 1*l.* 11*s.* 6¼*d.* as the prime cost of manufacturing each thousand cubic feet of gas, instead of 29*s.* 6*d.*, as stated in my former paper. In that paper I estimated the expence of producing 1000 cubic feet of coal gas, at 6*s.* 5*d.* To this I adhere.

Fourthly, It is asserted "that there is neither *residuum* requiring to be carted off, nor offensive odour emanating from an oil gas station."

This is really too much! Positively, it is not possible to imagine a more pungent, sickening effluvia than that which emanates from an oil gas work. Those who live near one are certainly the most competent to speak on this point. As to there being "no *residuum*, requiring to be carted off," it is perfectly notorious that every five gallons of some oils, of ordinary quality, will give one gallon of refuse; and others, perhaps of a superior quality, will give only about one gallon in seven of a most offensive fœtid *residuum*, which, together with the noxious effluvia from the volatile oil, I will

venture to say cannot be excelled, in odour, by the refuse or *hydro-sulphuret of lime*, from a coal gas work. In the coal gas works, however, they practise no concealments: they do not affect to court investigation, and then show only the most favourable part of their process: they show you *openly* their hydro-sulphuret of lime, as well as their tar, coke, and ammonia.

The acid, or *residuum*, described under this head, leads me naturally to revert again to the quantity of gas obtainable from a given quantity of oil. One hundred cubic feet per gallon has been represented to be the average quantity; but *experience* proves that this is not the case, and that $80\frac{1}{2}$ cubic feet is the true average quantity. The fact of the *residuum*, however, which, for one motive or another, has been rather made a mystery of, may even help to throw some light on this point. If, for example, in showing off experiments, this *residuum* has been mixed up with the volatile and the pure oil, and reckoned on as constituting a part of the useable oil, in taking account of the quantity of gas made from a specified quantity of oil, in that case there can be no doubt of the experiment having exhibited a very erroneous result: it would account exactly for the difference between the quantity of gas said to be obtainable, and that which is *actually* obtained. This is a curious coincidence, and merits some attention.

If, in 100 gallons of oil, one in five is found to be refuse, consequently 80 gallons only remain, from which gas may be said to be obtained. Should these 80 gallons give 100 feet each, being equal to 8000 feet, instead of 10,000, on the 100 gallons, this would bring the produce of each gallon, of the 100 to 80 cubic feet of gas exactly;—and by a parity of reasoning, those oils that are of a better quality, and give of refuse only one gallon in seven, would, of course, produce at the rate of 8600 cubic feet per 100 gallons, or

86 feet per gallon:—but the fact is, there are few oils that do not give of acid or *residuum*, one gallon in five; this may be taken, therefore, as the average.

But in future, to prevent any *mistake*, in mixing and calculating this *residuum*, with the pure and the volatile oils, it might, with submission, be suggested to experimentalists, not to allow the gas, immediately issuing from the retorts to pass over the oil vessel supplying the retorts with oil, as is the present practice at the oil gas works, but to direct it to pass over a separate and distinct vessel; and when the feeding vessel shall be emptied, let the condensed vapour, or volatile oil (as it is termed), deposited in this separate vessel, be sent again into the retorts, and made into gas, until no more gas can be obtained from it.—After this, the following results will be found to be pretty nearly correct:—

1st. That 100 gallons of cod or Greenland oil, of ordinary quality, will leave a *residuum* of about 20 gallons; and

2nd. That 100 gallons of oil will make only about 8000 cubic feet of gas, or 80 cubic feet per gallon.

Fifthly, "That oil gas, in burning, is not only free from smell and smoke, but likewise, that it cannot injure painting, polished steel, silks, nor gildings."

It so happens that this *is* true: but let it not be forgotten, at the same time, that this assertion is also equally applicable, in all its parts, to *coal gas*, when carefully and properly purified,—a process, which it is believed, is now generally performed, with scrupulous exactness, at all the coal gas works in the metropolis. I can speak with certainty as to the practice at one of those works.—Here, a *test*, formed by a solution of super acetate of lead, is constantly kept beside the dry lime and other purifiers, and the gas regularly subjected to this ordeal from time to time.

On the slightest appearance of tinge in the solution, the gas is instantly transferred to another and a fresh purifier. So that with this essential and necessary precaution, it becomes nearly a matter of absolute impossibility for any deleterious sulphureted hydrogen gas whatever, to escape and commix with that which is sent into the street, to supply their customers.—As to smoke, it is now pretty well understood that neither of the gases will emit smoke, if it is not allowed to escape, with an imperfect combustion:—those who pay by measure take special care that this shall not be the case.

The subject is hardly worth any more powder and shot. However, if I have leisure, I shall occasionally, *pour passer le temps*, send you the *histoire* of some of these oil gas establishments: "*Of those that are lighted, and those that are not.*" I am, Sir, yours, &c. A. H.

THE NEW COMET.

We beg to present our readers with the following general observations upon the celestial visitor which has recently made its appearance in our hemisphere:—

The New Comet which has been conspicuous since the commencement of the year, was first observed in the constellation *Ophiuchus vel Serpentarius.* Its progress has been amazingly rapid, having, in the course of little more than three weeks, passed through an arch of nearly seventy degrees. The apparent path of this comet was over the right shoulder of the constellation *Hercules*, through part of *Corona Septentrio* (the Northern Crown), over the right leg of *Hercules*, and towards the tail of *Draco.* "It is now, January 23rd," says one of our correspondents (Mr. Adams, of Edmonton), "about two degrees from the star *α*, in the Dragon's tail, its declination being upwards of 60 degrees north; of course it does not set in this latitude."

Mr. A. further states—"On the morning of January 7th, the first opportunity I had of observing it, the tail

was of considerable length and brilliancy: the second observation was not until the 12th, when the tail appeared to have so much decreased, that it might then have passed unobserved, unless its situation had been previously known: the coruscations of the tail were frequent, but not regular. Its appearance, between nine and ten on the evening of the 23rd, was truly wonderful, having two tails diametrically opposite to each other: that one towards the sun was least brilliant. This appearance was not only visible through the telescope, but was very distinctly perceived by the naked eye: several of my friends have observed this very singular appearance, and have also, with myself, noticed that an unusual nebulosity surrounds the nucleus of the Comet."

Another correspondent, having carefully traced the progress of the Comet states, that "it is proceeding nearly in a direct line above the back of *Ursa Major* (the Great Bear) towards the constellation *Auriga;* and that in the beginning of February, it will pass about midway between the bright star, *Dubhe* (the Northern Pointer) and the pole star." As, however, the Comet is receding from the sun in an orbit that appears to have considerable obliquity to the plane of the earth's path, it is most probable that we shall lose sight of this luminous object, by reason of its increasing distance from the earth, long before it reaches the constellation *Auriga.*

Novel Inventions.

Improved Melting-pots for Brass-founders.

Mr. Marshall, of Newcastle upon Tyne, has invented a new mode of making crucibles, and other melting-pots, of such materials, as shall render them less liable to crack in cooling than the ordinary pots used by the founders of London, Sheffield, Birmingham, &c.

Mr. Marshall's melting-pots are made of a mixture of Stourbridge clay, potsherds, and pulverized coke, well-incorporated together by beating; and instead of being *thrown* on the potter's wheel, they are made by pressing the composition into a brass mould of suitable size and figure, by means of a cone worked by a powerful screw-press. Thus the vessel acquires a considerable degree of solidity uniform throughout, while the intermixture of coke with the clay, by giving a certain porosity of texture, renders it much less liable to crack, on transition from heat to cold, than those melting-pots composed entirely of earthy ingredients as heretofore.

New Trumpet.

A new musical instrument is said to have been invented by Mr. J. Shaw, of Glossop, Derbyshire, which he terms a chromatic trumpet, on a principle professedly new. In point of execution, it is thought to be nearly equal to a Kent bugle, and its tones in no respect inferior to a common trumpet, properties which have never before been united in the same instrument. The principles on which it is constructed are applicable to every instrument of the horn kind, and may be conveniently adapted to the trombone, since precisely the same effect may be produced by the mere motion of a finger, as is obtained in the common slide-trombone, by moving the hand half a yard.

Polytechnic and Scientific Intelligence.

Royal Society.

In consequence of St. Andrew's Day falling on a Sunday, the anniversary meeting of this Society was held on the first of December, 1823, when a numerous attendance of the Fellows took place at Somerset House.

At 12 o'clock, the President (Sir Humphrey Davy) took the Chair, and began the business of the day, by reading a list of the newly-admitted members and of those who had been removed by death. The President took this opportunity of paying a tribute of respect to the memories of Dr. Hutton, Dr. Jenner, Dr. Baillie, and Colonel Lambton. He adverted to their various labours and discoveries with considerable eloquence, giving a sketch of the various improvements they had respectively introduced in those sciences to which they had devoted their attention. Speaking of Dr. Hutton, he observed, that his unceasing labours for more than half a century, had stamped his reputation as one of the greatest mathematicians of the age. After alluding to the various communications he had made to the Society, the President observed, that Dr. Hutton might be considered in a very high degree to have contributed to advance the character of the British officer by the spirit of emulation he had awakened and encouraged in the students of the Military Academy at Woolwich, during the long time he held the professorship. He also displayed his practical abilities in his paper "On Gunnery," which contained a series of valuable experiments on the force of gunpowder, from the result of which several important conclusions were drawn: for this he received the Copleyan medal in 1778. His greatest work, however, was his calculation of the density of the earth, founded on the experiments of Dr. Maskelyne: this performance alone would transmit his name with honour to posterity.

The President, in speaking of Dr. Jenner, noticed his strong claim to our admiration as having, by his discovery of vaccination, conferred one of the greatest benefits on the human race that was ever bestowed.

Of the virtues and talents of Dr. Baillie, the President spoke in the highest terms: his works would shew his accu-

racy of judgment, and acuteness in tracing physical effects to their primitive causes: he encouraged every kind of talent, and maintained to the last his simplicity of manners and dignity of character.

Sir Humphrey observed that two papers by the late Col. Lambton, on the admeasurement of an arc of the meridian in Hindostan, were already published, which displayed great accuracy and minuteness of observation. The extent of this arc is nearly ten degrees, and is the largest single arc ever measured on the surface of the globe.

In adverting to the papers of Archdeacon Wollaston, the President regretted that they were not more extensive; but the little which he had communicated was valuable for its distinctness and accuracy, observing, that his papers on the Measurement of Heights, and the Alteration of Temperature, were peculiarly valuable in ascertaining the heights of mountains. — The names of Dr. Cartwright and Mr. Jordan were also respectfully mentioned.

The President made some observations on awarding the Copleyan Medal to John Pond, Esq. Astronomer Royal, for the various communications he had made to the Society. In taking a cursory view of the labours of this gentleman, the President mentioned the difficulties of ascertaining the specific merits of astronomical observations, differing as they did from chemical and philosophical experiments, the results of which are immediately apparent, while the labours of the astronomer can only be duly appreciated by those who have witnessed their performance, or to whom such labours are familiar; and it frequently remains for posterity to judge of their merits, as they relate, in many instances, to distant periods of time.

After giving a hasty but luminous sketch of the labours of Flamstead, Bradley, and Maskelyne, Sir Humphrey adverted to the discussion on the subject of Parallax, in

which the Astronomer Royal was at present engaged. He then noticed the principal points of that discussion in the papers of the latter gentleman, viz. the grand and long-agitated question, of the parallax of the fixed stars, and an apparent declination, or change of position in some of them, not to be accounted for upon any known laws. The President observed that the Council, by this token of their respect for the Astronomer Royal, did not give any opinion on the subject of parallax, which was now brought into very narrow limits; neither did they enter into the subject of apparent declination, for it would require years, and new observations, and deep researches, before the judgment of scientific men could be fixed on a subject of such great importance.

The President, after alluding to the very great importance of these observations to a maritime country like Britain, noticed the powerful effect which astronomy had had on the human mind, by removing all the superstitious notions of the power of the heavenly bodies on the destinies of individuals and nations; all these superstitions had vanished, and the true system of the universe, as now developed, exhibited, in the highest degree, the infinite wisdom, intelligence, and power of its Creator.

On presenting the Medal, the President requested Mr. Pond to receive it as a mark of respect from the Society, and a token of the confidence placed in the accuracy of his observations, and as a memorial that future labours were expected from him in the same department of science. Much, he said, had been done, but nature was inexhaustible; and, at present, more perfect instruments and greater assistance was given, than any one had yet enjoyed. The government had entered into the views of the Royal Society, for improving the Royal Observatory, with the greatest liberality and promptitude. Astronomy has been the

greatest glory of this Society, and he trusted that it would lose no opportunity of patronizing those who improved it by their labours, or in any way advanced its progress.

Royal Institution, Albemarle Street.

THE lectures at this Institution are to commence on Saturday, the 7th of February next, and the following courses are announced for delivery in the season, viz.

On Electricity, Electro-Chemistry, and Electro-Magnetism, by W. T. Brande, Esq. Secretary to the Royal Society, and Professor of Chemistry in the Royal Institution—to commence on Saturday, 8th of February, and continue on each succeeding Saturday.

On Mechanical Philosophy and its recent improvements, particularly in Optics and Hydraulics, by John Millington, Esq. F.L.S. Secretary to the Astronomical Society and Professor of Mechanics in the Royal Institution, to commence on Thursday the 12th of February, and continue each succeeding Thursday.

On Botany and Vegetable Physiology, by John Frost, Esq. Professor of Botany to the Medico Botanical Society of London, to commence after Easter.

On Plane Geometry, by John Walker, Esq. M.R.I.A. to commence after Easter.

On Music, by W. Crotch, Musical Doctor and Professor of Music in the University of Oxford, to commence after Easter.

All the Lectures to begin at two o'clock.

New Patents Sealed, 1824.

To Thomas Greenwood, of Gildersoun, near Leeds, Machine-maker, and Joseph Thackrah, Surgical Mechanist, of Leeds, both in the County of York, for their invention of certain improvements on, or substitutes for, Pattens and Clogs.—Sealed 27th December, 1823. Two months for inrolment.

To John Vallance, of Brighton, in the County of Sussex, Esq. for his invention of an improved method or methods of Freezing Water.—Sealed 1st January, 1824. Six months for inrolment.

To Francis Devereux, of Cheapside, in the City of London, Merchant, for his invention of certain improvements on the Mill or Machine for grinding Wheat and other articles, commonly known by the name of the French Military Mill. —Sealed 8th January. Six months for inrolment.

To Joseph Foot, of Charles-street, Spitalfields, in the County of Middlesex, Silk-manufacturer, for his invention of an improved umbrella.—Sealed 15th January. Six months for inrolment.

To John White, of the New-road, in the Parish of St. Mary-le-bone, in the County of Middlesex, Architect, for his new-invented Floating Breakwater.—Sealed 15th January. Two months for inrolment.

To John Finlayson, of Muirkirk, in the County of Ayr, Farmer, for his invention of certain improvements on Ploughs and Harrows.—Sealed 15th January. Six months for inrolment.

To Jean le Grand, of Lemon-street, Goodman's-fields, in the County of Middlesex, Vinegar Manufacturer, in con-

sequence of a communication made to him by a certain foreigner residing abroad, and discoveries by himself, for certain improvements in fermented liquors, and the various products to be obtained therefrom, the same being new in this kingdom.—Sealed 15th January. Six months for inrolment.

To William Gutteridge, of Dean-street, St. Fin Barrs, in the County of Cork, Musician and Land Surveyor, for his invention of certain improvements on the Clarionet.—Sealed 19th January. Two months for inrolment.

To George Pollard, of Rupert-street, in the Parish of St. James, in the County of Middlesex, Brass Founder, for his invention of certain improvements on Machines or Machinery for levigating or grinding colours used in the various branches of painting, which machinery may be worked by any suitable power, and is applicable to other useful purposes.—Sealed 19th January. Two months for inrolment.

To James Russell, of Wednesbury, in the County of Stafford, Gas Tube Manufacturer for his invention of an improvement in the manufacture of Tubes for Gas, and other purposes.—Sealed 19th January. Two months for inrolment.

To Simeon Broadmeadow, of the Town of Abergavenny, in the County of Monmouth, Civil Engineer, for his invention of a new and improved method of manufacturing and purifying inflammable gases by the admission and admixture of atmospheric air.—Sealed 19th January. Four months for inrolment.

To Howard Fletcher, of Walsall, in the County of Stafford, Saddlers' Ironmonger, for his invention of certain improvements in tanning hides and other skins.—Sealed 19th January. Two months for inrolment.

CELESTIAL PHENOMENA, February, 18 .

D.	H.	M.	S.	
1	19	40	0	♃'s 4st. Sat. eclipsed.
2	9	45	0	☿ inferior conjunction, lat. 3° 25′ N.
7	15	30	0	☽ and ♄ in conj. long. 17° 21′ Taurus ☽ lat. 4° 36′ N. ♄ lat. 2° 9′ S. Dif. of lat. 6° 45′.
6	0	0	0	Clock 14′ 25″ before ☉.
7	15	3	0	☽ in □ first quarter.
10	17	30	0	☽ and ♃ in conj. long. 1° 23′ in Cancer ☽ lat. 1° 55′ N. ♃ lat. 0° 1′ N. Dif. of lat. 1° 54′.
12	0	0	0	Clock 14′ 36″ before ☉
13	7	0	0	☽ in Perigee.
13	1	4	0	♃'s 1st Sat. will emerge from his shadow.
14	19	25	0	Ecliptic opposition ☉ Full moon.
17	13	30	0	☾ and ♂ in conj. long. 13° 17′. in Libra ☾ lat. 5° 6′ S. ♂ lat. 3° 17′ N. Dif. of lat. 8° 23′
18	0	0	0	Clock 14′ 20″ before ☉
19	3	19	0	☉ enters Pisces.
21	9	28	0	♃'s 1st Sat. will emerge from his shadow.
21	17	16	0	☾ in □ last quarter.
24	5	36	0	☾ and ♅ in conj. long. 14° 23′ in Capricorn ☾ lat. 0° 45′ S. ♅ lat 0° 22′ S. Dif. of lat. 0° 23′
25	0	0	0	Clock 13′ 30″ before ☉
26	21	15	0	☾ and ☿ in conj. long. 10° 45′ in Aquarius ☾ lat. 1° 56′ N. ☿ lat. 0° 13′ N. Dif. of lat. 1° 13′
29	22	38	0	Ecliptic Conjunction ● New Moon.

The waxing moon ☽—the waning moon ☾.

METEOROLOGICAL JOURNAL, Dec. 1823, and Jan. 1824.

1823.	Thermo.		Barometer.		Rain in inches.	1824.	Thermo.		Barometer.		Rain in inches.
	Higt.	Low.	+	—			Higt.	Low.	+	—	
Dec.						Jan.					
27	45	36	29,20	29,16	..	11	41°	31°	30,27	30,05	..
28	51	32	,41	—,20	..	12	38	24	,30	—,29	..
29	46	36	,13	—,11	,05	13	32	23	,30	stat.	..
30	46	37	,13	—,05	,025	14	32	21	,24	—,23	..
31	46	36	,64	—,35	..	15	36	29	,23	—,20	..
Jan.						16	36	31	,40	—,33	..
1	44	35	,25	—,21	..	17	34	28	,36	—,32	..
2	45	36	,41	—,18	,075	18	42	34	,32	—,22	..
3	48	32	,90	30,29	,275	19	45	34	,05	—,02	,1
4	36	26	30,29	stat.	..	20	48	40	,05	29,91	..
5	38	28	,31	30,30	..	21	46	40	29,67	—,45	..
6	38	29	,16	—,10	..	22	46	37	,25	28,97	,325
7	39	28	,20	—,14	..	23	46	41	28,95	—,77	,2
8	36	28	,20	—,11	..	24					..
9	45	28	,11	—,09	..	25	54	50	29,99	29,85	..
10	47	40	,08	29,90	,125						

Lower Edmonton. C. H. ADAMS.

LITERARY AND SCIENTIFIC NOTICES.

Russian Discoveries in the south Polar sea.—The account of the voyage performed under the command of Captain Bellinghausen in the *Wostock*, and Captain Lazarew in the *Mirni*, has just appeared; it mentions the finding of thirty islands unknown to geographers; one is described as situated between Clerke's Rocks amd Sandwich Land, discovered on the 22d of December, to which the name of Marquis Traverse's Isle is given, in honour of their minister of marine; and in the south Pacific ocean seventeen more. On the 11th of January, 1821, another island surrounded with ice was discovered, which they named Peter I. It lies 69° 30′ S. lat. and 91° W. long. of Greenwich. Proceeding on the same parallel of latitude, they discovered a coast environed with ice, which has been denominated the Land of Alexander 1. These two discoveries are interesting inasmuch as they are the nearest points of land to the South Pole. From Alexander's Land, they repaired to South Shetland, which was examined with great care, adding a number of islands: from this point they proceeded to New Georgia, and from thence homeward, touching at Rio Janeiro and Lisbon, and arrived at Cronstadt on the 24th of July, 1821, after a voyage of two years and twenty-one days, with the loss of only three of their crew out of two hundred.

Fine Arts.—A report has been some time in circulation that the extensive collection of pictures, the property of the late John Julius Angerstein, Esq. is to be deposited in the new National Gallery at the British Museum, and that the same place is also to be the destination of Sir George Beaumont's fine works. It is still more gratifying to learn that it is his Majesty's intention to bequeath all his noble collection, to complete this splendid Gallery. The admirers of the fine arts will now congratulate themselves and the British empire, upon at last approaching a grand and memorable epoch in the history of its greatest refinements.

Mr. Buckingham has in the press a quarto volume of Travels among the Arab tribes in the countries east of Syria and Palestine.

A new periodical work is announced, under the title of the Cambridge Quarterly Review, and Academical Register. The first nnmber will appear early in March.

Architecture.—About to be published in six parts, by Mr. Joseph Gwilt, a fourth edition of Sir William Chamber's Treatise on the Decorative part of Civil Architecture.

Salvator Rosa.—Memoirs of the life and times of this celebrated painter are in the press, from the pen of Lady Morgan.

The 41st volume of the Transactions of the Society of Arts has just appeared, embellished with sixteen plates. Its contents are by no means so interesting as some of their former volumes. There are five papers on Agricultural subjects, six on Chemistry, four under the class of Polite Arts, two on subjects connected with Manufactures, twelve on Mechanical improvements of little importance, and two on Colonies and Trade. We shall notice some of these in our future Numbers.

Protecting Plants from Insects.—It has deen discovered that washing plants with a solution of bitter aloes, completely preserves them from the destructive effects of insects: one very great advantage attending the use of this liquid is, that the plants are not injured by it in any degree. In those cases where it has been tried, it is observed that insects do not attack the plants.

Ancient Bronze.—From various experiments, it appears that the bronze of which the ancients formed their weapons,&c. is composed of eighty-eight parts of copper, and twelve of tin; the same result has been obtained from various specimens which have been found in different places. It is a circumstance worthy of remark, that in nations greatly distant from each other, the same alloy has been used with but little variation.

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No. XXXIX.

Recent Patents.

To RICHARD ROBERTS, *of Manchester, in the County of Lancaster, Civil Engineer, for certain Machinery or Implements applicable to the Process of Weaving Plain or Figured Cloths, or Fabrics, which may be used on, and in Conjunction with, Looms now in common use; and also certain Improvements in the construction of Looms for Weaving Plain and Figured Cloths or Fabrics, and in the Method of Working Looms either by Hand, by Steam, or by other power.*

[Sealed 14th November, 1822.]

THESE improvements are divided into several heads, the first of which consists in an improved manner of constructing and applying the tappets which are employed for raising and depressing the different shafts or heddles in those looms where more than two shafts or heddles are used. This part of the improvement is applicable both to hand looms and

those which are worked by power. Plate VI. contains several views of a power loom, having six shafts or heddles, adapted to weave twilled cloths or fustians, and such other fabrics as have the threads crossed in weaving, in that peculiar manner called twill. Fig. 1, is a front view of the loom (the cloth-roller and breast-beam being removed, in order to exhibit the parts behind). Fig. 2 represents the left hand end of the loom; Fig. 3, the right hand end; and Fig. 4 is a horizontal view, that is, looking down upon the top.

The framing is of cast iron, bolted or screwed together, so as to render the whole firm; *a* is the yarn-roller, upon which the warps are wound, and this is made to turn with considerable friction, by means of cords passing over pullies, with weights suspended in order to keep the warp tight. The warp is drawn from this roller over a small roller *b*, and from thence is conducted to the lease-rods *c*, and through the loops of the several heddles *d*. These heddles are made to move up and down (in the manner hereafter to be described), for the purpose of separating the warp into two sheds, between which the shuttle is to pass, for the purpose of bringing the weft threads between those of the warp, and thereby weaving the fabric; *e* is the lay in which the reed is placed, consisting of a series of fine wires; between these wires the warp passes, and by it the threads are separated. This lay is supported by two arms *f f*, and vibrates upon a shaft with pivots below.

The lay is moved backward to enable the shuttle to pass along its race between the divided parts of the warp, and it is brought forward to beat up the weft after the shuttle has passed; *g* is the place of the breast-beam, over which the cloth or other fabric passes when it is woven, and descends from the breast-beam to the roller *h*, where it is wound up. On the end of the axle of this roller *h*, there is a toothed-

wheel *i*, (seen in fig. 3,) which takes into a pinion upon the axle of the ratchet-wheel *k*. A click or pall at the end of the cross-lever falls into this ratchet, and the lower end of the cross-lever being connected to the leg of the lay, moves with it, turning upon a pivot in the centre of the cross, and every time that the lay goes backward, the click pulls the ratchet-wheel one tooth, thereby causing the pinion to move the roller *i*, round with a very slow motion, by which the cloth is progressively drawn on to the roller as it accumulates in the loom.

The machinery is put in motion by means of the band *m*, seen in fig. 2, which proceeds from the steam-engine, or any other first mover, and passes over the rigger *n*, which is fixed to a small fly-wheel upon the end of the main shaft of the loom shown at *o o*, fig. 4. This shaft *o*, has two cranks upon it, which by means of the connecting links *p p*, gives motion to the lay. The other end of this shaft has a small toothed-wheel *q*, seen at fig. 3, which takes into another toothed-wheel *r*, of twice the diameter, which last is fixed upon the end of an horizontal axle *t t*, extending the whole width of the loom, as shown at fig. 1. This axle has a small bevil-pinion *v*, fixed upon it, which actuates a bevel-wheel *u*, upon the cross axle *w*. The tappet-wheel *x*, is also fixed upon this axle, and the geer is so regulated that the tappet-wheel makes one revolution to every nine revolutions of the crank-shaft.

The tappet-wheel *x*, is formed by two wheels which carry nine small axles, on each of these axles are six small friction rollers, making in the whole fifty-four friction-rollers. These rollers are intended to act upon twelve curved levers *y*, *z*, fig. 1. The curved levers move upon fixed centres supported in small bearings; six of these curved levers are supported at 1, and the other six at 2, crossing each other, as shown in fig. 1, the extremities of the levers alternately

rising and falling. The ends of these levers, toward the middle of the loom, are attached by cords to the lower rails of the heddles, and their other extremities by cords to the top levers, from which are suspended the upper rails of the heddles.

The operation of the tappet-wheel upon the heddles is this:—Having been actuated by means of the shaft and geer, as before described, the wheel in its revolution causes the friction-rollers to strike alternately upon one or other of the levers *y* or *z*, and force them down, by which means the respective heddles are depressed or raised at certain parts of the operation, and these drawing the sheds of the warp up or down to permit the shuttle to pass, as before described, dispose the warp according to that particular arrangement which is calculated to produce a twilled fabric. In order to vary the twill, the friction-rollers are capable of being shifted, and by so disposing the collets between the rollers, certain of them may be situated so as not to act upon any particular one or more of the curved levers.

The operation of pecking, or throwing the shuttle, is effected by means of a double arm or tappet, 3, on the axis of the shaft *t t*, which acts upon the levers 4, seen in fig. 3, from whence rods and bands pass to a vibrating lever 5, upon the axle of a wheel at the top of the loom in front, as seen in fig. 1. Thus the revolution of the tappets 3, causing the alteration of the levers 4, produce the vibratory action of the lever 5; and cords being passed from this lever to the peckers 6, 6, cause the peckers alternately to strike the shuttle out of its box, and send it across the lay *e*.

There is a provision in case the shuttle should by any accident stop in the race, to prevent the lay from coming forward, which would otherwise break the reed; this is by means of small springs in the shuttle-boxes, which, when the shuttle has not reached its destination, stand out and

catch against small projections, and by that means stop the advance of the lay. Whenever this happens, the main strap *m*, is, by the sudden action of a spring, pushed off the rigger of the main shaft, and the machinery is altogether stopped until the accidental interruption is removed.

(To be continued.)

To JOHN ISAAC HAWKINS, *of Pentonville, Civil Engineer, and* SAMPSON MORDANT, *of Union Street, City Road, Portable Pen-Maker, for their Improvements on Pencil-holders, or Portcrayons, and on Pens for the purpose of facilitating Writing and Drawing, by rendering the frequent Cutting or Mending of the Points or Nibs unnecessary.*

[Sealed 20th December, 1822.]

THE first of these improvements is a pencil case, with an internal slider actuated by a screw, for the purpose of projecting the black lead forward, so that the point may be advanced as it wears away, without the trouble of cutting; the same contrivance applying also to crayons, chalk, and coloured pencils. Plate VII. Fig. 9, is a section of the pencil-case; *a* is the black lead, enclosed by that part of the case called the nozzle. This is made of metal, and has two milled rings on its outside for the purpose of holding it with firmness between the finger and thumb; *b b*, is the driver, a hollow cylindrical piece, with a screw thread running round a part of it, into which the end of the black lead *a*, passes and is held fast. This driver is elongated at *c*, and passes through a small box *d*, which acts as a guide; *e e*, is a cylindrical piece connected to the nozzle, having at

its end a female screw that works round on the thread of the driver *b*, and as it turns, causes the projector to advance or recede; *ff*, is the outer case of the pencil, which is made of metal, and may be coated with gold, silver, ivory, tortoise-shell, or any other suitable material.

The point of the black lead, crayon, chalk, or coloured pencil *a*, placed in the nozzle, having been once formed, whenever it has become worn, the left hand finger and thumb of the draftsman must hold the milled collar of the nozzle, and the finger and thumb of the right hand turn the outer case round, by which means the box *d*, moving with the case, will cause the driver *b* to turn, and the screw part of the driver being embraced by the screw of the cylindrical piece *e e*, will cause the driver to project the point of the black lead or crayon *a*, forward.

There are several variations of the above proposed, such as making three or four nozzles suited to different thicknesses of lead or crayon; and also pieces are provided to place upon the driver suited to these circumstances. Another form of the case is likewise proposed, by which several pencils or crayons may be contained within, ready for placing in the central situation when required.

The second part of the improvement respects the making of pens, which are proposed to be formed of tortoise-shell or horn instead of quill. The material, when cut into nibs, is to be softened by immersion in boiling water, and small particles of diamond, ruby, or other very hard substance, impressed into the points, by which means pens are made, combining great durability with pleasant elasticity.

It is further proposed, to give stability to the nibs by affixing to the tortoise-shell or horn thin pieces of gold, or other metal, and attaching the same by the before-mentioned means, or by any other convenient mode, such as cement or varnish. It is also suggested that springs may be placed

at the back of the pens by means of forked pieces, as shewn at Fig. 10, which may be slidden forward or backward, according to the required stiffness of the pen to suit various kinds of writing.

[*Inrolled, June,* 1823.]

To GEORGE DIGGLES, *of College-street, in the parish of St. John, Westminster, in the County of Middlesex, Gentleman, for his Invention of an Improved Bit for Riding of Horses, and for Horses used in Single and Double Harness.*

[Sealed 19th August, 1823.]

THE patentee considers that the ordinary mode of driving from the curb is attended with inconvenience, and sometimes is productive of serious injury to the horse. The irritation occasioned by the continued action of the lever, frequently distresses the animal, and makes him even reject his food, and it is no uncommon occurrence that the mouth of the horse becomes so much lacerated by the use of the curb as to injure the jaw-bone. At all events, the constant employment of the curb renders the mouth callous, and in case of a false step, the check loses its effect; and, on a journey, the mouth being kept open, becomes parched and filled with dust, to the injury of the health and spirits of the animal.

To obviate these objections, this improved bit is proposed, which operates in the same way as a common bit for ordinary riding or driving, but is designed to afford the ready means of instantly exerting a very considerable purchase upon the horse's mouth when occasion shall require it, without the trouble of getting off the horse, or out of the carriage.

The improvement consists in a sliding piece, with a ring attached to each cheek of the bit, to which ring the riding

or driving rein is to be connected in the usual way, and when it is found necessary to exert a considerable force in curbing the horse, the pulling of the rein will draw the slide to the bottom of the cheek, and give an increased leverage to the bit. Plate VII. Fig. 5, represents part of a horse's head, with the improved bit, as it would appear in the ordinary driving or riding position, the dotted lines shewing the situation of the parts when the rein is pulled with considerable force. Fig. 6, is a front view of the bit, and Fig. 7, is the side of the bit in the position shewn by the dotted lines in the previous figure; *a* is the driving or riding rein, buckled to the ring *b*, which ring, instead of being fixed to the check of the bit, as is the usual way, in this improved bit is attached to a sliding-piece *c*, shewn detached at Fig. 8. A helical spring *d*, acts upon this sliding piece, and keeps it and the ring *b*, up to that part of the cheek which is near the mouth-piece *e*, where the purchase of the lever is necessarily small, and where the riding or driving rein will act in the usual way; but when it becomes necessary to exert an extraordinary power upon the horse's mouth, then the rein *a*, being pulled back with considerable force, will cause the cheek of the bit *f*, to move out of the perpendicular position, and the piece *e*, carrying the ring and rein to slide towards the lower part of the cheek, as seen in Fig. 7. By these means the rider or driver has obtained so great a purchase upon the mouth, that the most ungovernable horse must yield to the pressure of the curb; but the moment that the tension of the rein is relaxed, the cheek of the bit resumes its first position, and the spring *d*, draws up the sliding-piece *c*, with the ring *b*, and rein *a*, to its ordinary place, as at Fig. 5.

The general operation of this improved bit being described, the particular construction of its parts follow. Near the upper extremity of each cheek *f*, a small piece *g*, is attached, called the cap; on the under side of which a hole is made to

receive the end of the helical-spring *d*; at the lower end of this spring a swivel *i*, is attached, and this is made fast to the sliding piece *c*, by a screw. In order to enclose the spring and shield it from dirt and dust a cover *k*, is attached to the cheek of the bit, and for the convenience of occasionally oiling and wiping the spring, this cover is made to slide up and down in grooves, formed in the sides of the cheek; these grooves extending but a little way down enables the covers to slide off when necessary, for the convenience of removing the spring if required, when one of greater or less elastic force may be substituted, as circumstances may render desirable.

The specification closes, by stating, "that by the above explanation, the principle, construction, and advantages of the improved bit will be fully evident; but it is to be understood, that the inventor does not confine himself to any particular dimensions, and is aware that several parts may be slightly varied without deviating from the principles, and he does not claim the mechanical contrivances above described as new in themselves, but only as connected to a *bridle bit.*"

[*Inrolled, February,* 1824.]

To RICHARD BADNALL *the younger, of Leek, in the County of Stafford, Silk Manufacturer, for an Invention of certain Improvements in the throwing, twisting, or spinning of Sewing Silks, Organzine, Bergam, and such other descriptions of Silk as the said Improvement may be applicable to.*

[Sealed 18th March, 1823.]

THESE improvements consist in certain methods of actuating the bobbins and flyers of spinning machinery, for the purpose of producing the different kinds of silken

thread, technically called organzine, tram, and bergam. Plate VII. Fig. 1, shews one of the spindles, with its accompanying bobbins and guide-wires, of which there are many similar spindles in one spinning-frame, the whole being actuated by a band passing from a drum-wheel: *a* is the spindle, having at its lower part a whorl *b*, against which the impelling band presses, and causes the spindle to revolve with great velocity. Upon this spindle are fixed the two cross pieces *c* and *d*, which carry the spindles *e e*, the bobbins *f f*, and guide-wires *g g*; upon each of these spindles *e e*, a toothed-wheel *h h*, is fixed; and these take into a toothed-ring *i i*, secured to the rails *k k*. The construction of this part of the apparatus will be best seen at Fig. 2, which is a horizontal representation of the ring *i*, the toothed-wheels *h h*, and the cross piece *c*, fixed upon the centre spindle *a*. On the top of this spindle *a*, at Fig. 1, it will be seen that a cap is fixed, in which the guide wires *l l*, and *m m*, are inserted.

Rotatory motion being given to the central spindles *a*, by the band, as above said, the fixed toothed-ring *i*, causes the wheel *h h*, with the bobbins *f f*, and guide-wires *g g*, to revolve in a direction contrary to that of the central spindle, by which means the filaments of silk delivered from the bobbins *f f*, become twisted or spun in its passage through the guide wires *g g*, and *m m*.

Before that the threads thus formed pass through the upper guide-wires *l l*, they are crossed, as shewn at *n*, exactly over the centre of the spindle *a*, and after passing through the eye of the fixed guide-wire *o*, become twisted together by the action of the central spindle, and are then taken up by a reel, as is usual in other silk throwsting machinery.

In case one of the threads should break in twisting, it is necessary to prevent the other single thread from being taken up by the reel. This is effected by fixing a knife *p*,

on the edge of the upper rail, and when the broken thread slips from the crossing, at *n*, the entire thread comes (as the dotted line) against the edge of the knife *p*, and is cut asunder. The person attendant upon the machinery must now push in the bolt *q*, and thereby stop the revolution of the spindle until he has re-united the broken threads, when by drawing the bolt *q*, back again, the process will go on as before,

The machinery, as above described, is calculated to produce that kind of silk thread called *organzine;* but it may be necessary to make another sort of thread, called *tram.* This may be effected in the same machine, by stopping the revolution of the spindles *e e*, and raising the wheels *h h*, out of the toothed-ring *i*; to do this, a screw *r*, in which the spindle *a*, rests, must be raised, and a latch-bolt *s*, let fall into the teeth of the wheels, so as to lock them fast; the main spindle *a*, will then revolve, carrying the bobbins as before; but now the bobbins will not turn upon their own axles, and the material produced under these circumstances will be *tram.* Another species of spun silk, called *bergam*, may be made in this machinery, by taking one of the toothed-wheels *h*, off its spindle, the other wheel being allowed to work in the toothed-ring: this, however, will scarcely ever be required, when *organzine* can be obtained in the same machine, without any increase of expence.

The spindles *e e*, may be made to revolve without the intervention of the toothed-ring *i*, instead of which the interior of the ring *i*, may have a convolute spring *j*, pressing against the two wheels *h h*, which are made smooth on their periphery, as shewn at Fig. 3. The spring so placed will produce sufficient friction upon the edges of the wheels to cause the spindles *e e*, to revolve with a similar effect to that described above.

In winding the silk upon the bobbins, preparatory to

throwing, twisting, or spinning, the patentee recommends that guiders be employed, such as are commonly used in doubling frames, this is to prevent the silk from collecting upon the edges of the bobbins, which would be a considerable impediment to the operation of the throwing machine.

For throwing or twisting sewing silks it is desirable that the velocity of the bobbin-spindles should in general nearer approximate to that of the main spindles than can be conveniently effected upon the above plan; another modification of the invention is therefore proposed for that purpose, as shown at Fig. 4, and in which any required proportion of twist between the main spindles and bobbin-spindles can be produced by altering the proportions of the wheels of the main spindle and bobbin-spindles, one to the other, and thus producing a machine capable of effecting almost every variation of throwing or twisting.

In Fig. 4, *a* is one of the central or main spindles, actuated by the band passing over the whorl *b*, as before; upon this spindle is a pinion or toothed-wheel *c*, which turns the toothed-wheels *d d*, fixed upon the bobbin-spindles *e e*, thus it will be seen that while the main spindle *a*, revolves in one direction, the bobbins turn the contrary way, and the proportionate velocity of one to the other will depend upon the relative diameters of the wheel *d d*, to that of the pinion or toothed-wheel *c*, which may be varied to suit any required throw. The silk from the bobbins *f f*, being twisted by this operation, is afterwards drawn through the guide wires *g g*, by the rollers *h*, *i*, the former of which is actuated by the first mover of the machinery, and the latter turned by its own weight and friction, pressing against the lower roller, the revolutions of these rollers being duly adjusted to the required twist.

The two threads of silk after passing between the rollers *h*, *i*, descends through the guide-wire or flyer *k*, fixed upon

the top of the central spindle, and is by that means doubled and twisted in a contrary direction to the previous twist, and is delivered from the lower part of this flyer *k*, on to the receiving-bobbin *l*, in a finished state. In order that the spun silken cord may be wound uniformly upon the receiving bobbin, there is a contrivance for raising and lowering the bobbin upon the spindle *a*, where it slides loosely, this is affected by a lever *m*, the end of which holds or guides the lower part of the bobbin, and this lever is made to rise and fall by means of a crank-rod *n*, connected to a wheel *o*, which is actuated by a pinion on the shaft of the drawing roller *h*; thus the silk is wound round the bobbin in uniform coils, one beside the other, the adjustments of the movements causing the bobbin to ascend and descend exactly in the time required for distributing the silk from end to end of its periphery; and a spring *p*, is attached to the upper side of the lever for the purpose of regulating the drawing of the bobbin; this, however, is only necessary when the bobbin is nearly empty.

Should *tram* be required to be produced by this machinery, it is only necessary to raise the central spindle *a*, by means of the screw *r*, which receives its pivot; this will cause the pinion *c*, to be withdrawn from the wheels *d d*, when the revolutions of the bobbin spindles upon their axes will cease, and the same effects will take place as described before.

There are several parts of this apparatus which, as the patentee acknowledges, are common to cotton machinery: the claims of originality as appertaining to this particular operation of silk throwing are, therefore, defined by the following observations, which also embrace the variations of detail contemplated.

"I have described the various parts of the machines and the methods of applying them to use. I do not, however, mean or intend thereby, to limit myself to those methods

only, but to avail myself of every means by which my said improvements can be carried into effect; neither do I intend hereby to claim as my invention each particular part of which these machines may be composed, although I do their general arrangement, nor as in Figures 1, 2, and 3; the revolution of two secondary spindles around a main one, however actuated, whether by being placed within a circle, or by any other method of producing the same effect, which I have in different places seen accomplished in different ways; but having overcome the main difficulty, which I conceive has hitherto been an obstacle to the perfection of such methods, by an invention of preventing single threads being reeled, by crossing and cutting them, I do hereby claim that particular method."

"The general arrangement too of Fig. 4, I claim as a new combination of machinery; and in particular the actuating of the spindles *c*, *e*, and *a*, by wheels, whether toothed or plain, which prevents the possibility of irregular movements, and by giving an unlimited power of varying their proportions renders them applicable to almost every description of silk throwing."

[*Inrolled, September*, 1823.]

To MATHIAS ARCHIBALD ROBINSON, *of Red Lion-street, in the Parish of St. George the Martyr, in the County of Middlesex, for his Invention of certain Improvements in the Modes of Preparing the Vegetable Matter commonly called Pearl Barley and Grits, or Groats, by which Material, when so Prepared, a Superior Mucilaginous Beverage may be produced in a few Minutes.*

[Sealed 28th August, 1823.]

THESE improvements consist in a peculiar mode of drying and otherwise treating the grain, by which process its vege-

tating properties are destroyed, and a meal is produced, divested of rawness, and free from the impurities of husk or fibre. This meal, when so prepared, is entirely soluble in water, and will, with boiling water, produce a perfectly smooth, and almost transparent mucilage in a few minutes.

The process of preparation is as follows:—Any quantity of pearl barley or groats intended to be operated upon is taken in the state it is usually sold at the shops, and the first process is to cleanse it from seeds, dust, and husks, or other impurities, by winnowing. After this the grain is carefully looked over, and any extraneous matters which have not been separated by the winnowing machine are to be picked out.

In this cleansed state the grain is to be spread over the bottoms of sieves, in level layers of about an inch and three quarters thick. These sieves are then deposited on ledges in closets heated by steam boxes, or steam passages, the temperature of which should be gradually increased to 160 or 170 degrees of Fahrenheit's thermometer. Under this temperature the grain is permitted to remain for about three hours, in order to dry gradually: the aqueous parts evaporated, being drawn off by suitable pipes leading from the hot closet. By these means the vegetating properties of the grain will be killed, and the raw taste removed without parching or roasting it.

When the grain has been thus sufficiently dried, it is spread out in large hoppers or troughs, to cool, and this being effected, it is passed through the funnels of the hoppers down to steel mills below, where it is to be ground by hand, or other convenient power, sliders being placed in the funnels of the hoppers for the purpose of regulating the supply of grain descending into the steel mills.

The meal falling from the mills is received into boxes, and is to be thence removed for dressing into bolting machinery of the ordinary construction. The cylinders of these bolt-

ing machines should be made of fine wire gauze, of from twenty to thirty-six wires in the inch, and when the meal has passed through the finest of them, it may be considered to be completely fit for use.

The patentee states that a table-spoon full of this prepared material, mixed up first in two spoons full of cold water, and made perfectly smooth, and then with the addition of a sufficient quantity of water, boiled for a few minutes, will produce the mucilage called barley-water, of a very superior quality to that obtained by the ordinary process of boiling the barley for some hours, the mucilage being strained through muslin, and flavoured with lemon peel or juice, and sweetened with honey or refined sugar.

An excellent and nutritive food for infants may be made by mixing the above preparation with milk and water, instead of water alone. It will also be found to be a very desirable material for thickening broths; it may be mixed and introduced into the broth half an hour before it is taken off the fire.

The powder of the groats prepared as above, is to be mixed in the same way, and gruel may be produced from it in ten minutes, and of a quality very much superior to that obtained from every other preparation of oats heretofore presented to the public; puddings also, of an excellent quality, may be made from this preparation.

The patentee states—"I am aware that several unimportant variations may be made in the process above described; but I wish it to be understood that I rest my claim of patent right in a method or methods of drying the grain under a regular temperature, without roasting or parching it, so as to destroy its vegetating properties, and at the same time retain its nutritive qualities unimpaired; by which preparation the meal is brought into a condition that will enable it to keep perfectly good in any climate.

[*Inrolled, February,* 1824.]

To William Jeaks, *of Great Russell Street, in the Parish of St. George, Bloomsbury, in the County of Middlesex, Ironmonger, for his Invention of an Apparatus for regulating the supply of Water in Steam-boilers, and other Vessels for containing Water or other Liquids.*

[Sealed, July 24, 1823.]

The improvements herein proposed will be best understood by first pointing out an inconvenience to which apparatus for a similar purpose have been heretofore subject. An eligible mode of regulating the supply of water admitted into tanks, cisterns, boilers, or other vessels, and of shutting it off as the vessel becomes full, has been by attaching a hollow metal ball as a float to the cock of the supply-pipe, by means of an arm or lever, which rising with the float, closes the cock of the supply-pipe as the water ascends to the top of the vessel. When this sort of hollow ball is introduced as a float into a steam-boiler for the purpose of regulating the supply of water, the very considerable heat of the steam expands the air within the hollow ball, and frequently rends it open, under which circumstances the water gains access to the interior of the ball, and thereby destroying its buoyancy, renders the apparatus of no use.

To remedy this defect, the present invention is proposed, and consists first of a hollow arm or rod, carrying the float-ball, by which means as the temperature becomes raised, the rarified air within the ball finds vent through the hollow arm into the atmosphere, and as the temperature lowers, the surrounding atmosphere finds its way into the ball.

Plate VIII; fig. 1, represents a section of the improved apparatus, consisting of a supply-cistern, with its pipes, float, lever, and other appendages as connected to the boiler

of a cooking apparatus. *a* is a reservoir of water placed in any convenient situation; *b* is the supply-pipe from which the water flows into the supply-cistern *c*, and thence through a valve *d*, into the cylinder *e*, where the ball *f*, floats. At the bottom of this cylinder a pipe g, is attached which conveys the water into the boiler *h*. To the stem of the float *f*, the disc *i*, is affixed, and by its rising and falling the valve *d*, is shut or opened. As the water flows in the cylinder *e*, to the same height as in the boiler *h*, it follows that whenever the water is low in the boiler *h*, the float *f* will descend and the valve *d* be opened, so as to permit the water to flow through the valve into the cylinder, and thence through the pipe *g*, to the boiler. By these means the water will soon rise to its proper level in the boiler, and the float at the same time rising also in the cylinder, will close the valve and prevent any further accession of water.

To *k*, the upper part of the stem of the float, a long lever *l*, is connected, which moves upon a fulcrum-pin in the arm *m*; the shorter end of this lever acts against a pin with a conical top *n*, and as the float-ball descends opening the the valve *d*, the longer arm of the lever *l*, descends also, and causes its shorter arm to lift the valve *n*, and permit the water to flow from the pipe *b*, into the supply-cistern *c*, and thence through the valve *d*, to the cylinder *e*, and ultimately to the boiler; but when the float rises, the cone *n* is permitted to fall and close the valve. There is a stop-cock at *o*, for shutting off the water in the pipe *b*, whenever the apparatus requires to be removed for repairs or from any other cause.

The pressure of the steam within the boiler acting upon the surface of the water, will sometimes, by its force, cause the water to return through the pipe *g*, and fill the cylinder *e*; the valve *d*, however, being closed, the water will rise in the pipe *p*, until the weight of the column of water exactly

balances the pressure of the steam. Supposing the boiler to be heated so that the steam shall exert a pressure of 1lb. on every superficial inch, then the column of water *p*, will rise to the altitude of 36 inches. Under these circumstances the hollow metal ball or float *f*, will be enveloped in boiling water, by the heat of which, the air within will be expanded; the ball however having an opening through the hollow stem *k*, to the atmosphere, the air will be permitted to escape without injuring the ball, which if confined might probably have burst it open. In order to guard against the water by any accidental leakage of the valve *n*, filling the supply-cistern *c*, a small waste-pipe is introduced into the cistern, the top opening of which is a little above the proper level of the water.

Fig. 2, shews a similar cylindrical cistern *e*, float-ball *f*, and valve *d*, to those represented in fig. 1, the supply-cistern *c*, varying slightly in form from that in the former figure. This is to exhibit a different mode of regulating the flow of water from the supply-pipe *b*, to that adopted in fig. 1. Here the water passes from the pipe *b*, through an ordinary cock, upon the square end of which the lever *r*, is affixed, and passing through a slit in the stem *k*, rises and falls with the float-ball, by which means when the level of the water in the cylinder rises sufficiently high, the valve *d*, is closed by the disc *i*, and also the cock of the pipe *b*, shut by the rising of the lever *r*.

Fig. 3, represents one of the improved ball-cocks when placed within a boiler, and fig. 4, is a section of the pipes and cock as in the preceding figure, shewing their internal passages, the same letters refering to the same parts respectively in these two figures.—*a* the reservoir of water which supplies the boiler; this should be of such height that the column of water contained therein will at all times overcome the force of the steam; *b* the supply-pipe, *c* the boiler,

d the cock, *e* the arm or lever which turns the cock, *f* the hollow metallic ball-float. The rising of the surface of the water in the boiler causes the float *f* to lift the arm *e*, and shut the cock *d*, as in ordinary ball-cocks; but as the air within the ball will expand by the heat of the steam surrounding it, there would be a tendency of the ball to burst, as before mentioned. This, however, is prevented by the hollow arm *e*, through which the rarified air escapes from the ball and passes, by means of a longitudinal passage in the cock *d*, to the vent-pipe *g*, placed by the side of the supply-pipe *b*, and opening into the atmosphere.

The patentee concludes by saying, "Having thus described the modes of constructing my newly invented apparatus for regulating the supply of water in steam-boilers, I proceed to state particularly in what my claim of patent right consists; viz. 1st. In forming a communication from the interior of the float-ball to the atmosphere, by which the rarified air may escape without bursting the float. 2nd. In preventing the water from overflowing the supply-cistern when acted upon by the pressure of the incumbent steam in the boiler; and 3rd. In a means of ensuring a certain and more steady supply of water to the boiler by means of a column of water raised and balanced by the pressure of the steam.

[*Inrolled, January*, 1824.]

To Edward Ollerenshaw, *of Manchester, in the County of Lancaster, Hat Manufacturer, for a Method of Dressing and Finishing Hats by means of certain Machinery, and Implements to be used and applied thereto.*

[Sealed 27th May, 1823.]

This is a sort of lathe or machine by which hats are made to revolve during the operation of ironing them. Plate VIII.

Fig. 5, represents the framework, or standard, upon which three of these lathes are mounted, as A, B, C. The lathe A is intended to be employed where the crown of the hat is ironed. The lathe B, when the flat top, and the upper side of the brim is ironed, and the lathe C, when the under side of the brim is ironed; motion being given to the whole by means of a band passing from any first mover (as a steam-engine, water-wheel, &c.) to the drum on the main shaft *a a*. From this drum a strap passes over the rigger *b*, which actuates the axle of the lathe A. On to this lathe a sort of chuck is screwed, and to the chuck, the block *c* is made fast by screws, bolts, or pins. This block is represented in section, in order to shew the manner in which it is made, of several pieces held fast by the centre wedge piece, as seen at Fig. 6.

The hat-block being made to turn round with the chuck, at the rate of about twenty turns per minute, but in the opposite direction to the revolution of an ordinary turning lathe, the workman applies his hot iron to the surface of the hat, and thereby smoothes it, giving a beautiful glossy appearance to the beaver; he then applies a plush cushion, and rubs round the surface of the hat while it is still revolving. The hat, with its block, is now removed to the lathe B, where it is placed upon the chuck *d*, and made to turn in a horizontal direction, at the rate of about twenty turns per minute, for the purpose of ironing the flat top of the crown. This lathe B moves upon an upright shaft *e*, and is actuated by a twisted band passing from the main shaft, round the rigger *f*. In order to iron the upper surface of the brim the block *c* is removed from the lathe, and taken out of the hat, when the block fig. 8, is mounted upon the chuck *d*, and made to turn under the hand of the workman, as before.

The hat is now to be removed to the lathe C, where it is introduced in an inverted position, between the arms *g g*, supporting the rim *h h*, the top surface of which is shewn at

fig. 7. The spindle *i* of the lathe turns by similar means to the last, but slower, only ten turns per minute will be sufficient. The workman now smoothes the under side of the brim, by drawing the iron across it, that is from the centre outwards. The hat is then carefully examined, and all the burs and coarse hairs picked out, after which the smoothing process is carried through as before, and the dressing of the hat is complete.

The patentee states his invention to consist in "the aforesaid method of applying mechanical power to give a continuous circular or rotary motion to the hat, at the same time that the workman holds and applies the face of a heated iron thereupon, with sufficient force and pressure to produce the finish and gloss of the beaver; but as the workman has very little motion to give to the iron, the effect is produced in less time, and with greater ease, than by the common method"

[*Inrolled, October,* 1823.]

To EDWARD EYRE *of Sheffield, in the County of York, Fender Manufacturer, for his Invention of an Improvement in the Manufacture of Fenders of Brass, Iron, or Steel.*

[Sealed, 15th May, 1823.]

THE specification commences by referring to the patent of Henry Ibbotson of Sheffield, for "an invention of a fender capable of being extended or contracted in length, so as to fit fire-places of different dimensions." (See our fifth vol. p. 182.) In the specification referred to, Mr. Ibbotson has confined himself to certain modes of sliding the parts of the fender in *straight lines,* whereas the present patentee proposed to extend or contract his improved fender in

curved lines. The moveable ends of these fenders are attached to the fixed middle parts by pivots or hinge-joints, so that the ends move in arcs of circles; and the patentee claims "every method by which this invention can be carried into effect."

Plate VIII. Fig. 9, will exhibit the mode proposed to effect the above object. This figure represents the inside of a fender seen in perspective; *a* is the front part, fixed to the bottom *b*; *c c* are the two moveable ends, which turn upon the hinge-joints *d d*, and *e e*, are the pieces which slide under the fixed bottom of the fender. It will be here seen, that by the end-pieces *c c*, being moved inward, the dimensions of the fender becomes contracted, and by moving the said end-pieces outward, it is extended. The fender is usually supported upon three feet, or balls, but the shape or ornaments do not form any part of the invention, which consists simply in enabling the ends to turn upon the hinge-joints, as described

[*Inrolled, July*, 1823.]

To Francis Deakin *of Birmingham, in the County of Warwick, Sword Maker, for an Improvement on Piano-Fortes, and other Stringed Instruments.*

[Sealed, 18th February, 1823.

This improvement consists in the application of steel wire hardened and tempered, and cast steel wire, which may or may not be hardened and tempered, to piano-fortes and other stringed instruments, and also in the mode of fastening such wires to the instruments. As these hardened steel wires cannot be wound round a pin or peg, as the ordinary strings of piano-fortes usually are, it is necessary to hold them fast by means of clamps and adjusting-screws, which are shewn in Plate VIII. Fig. 10 is one of these

clamps, with its stem and screw; *a* is the box and stem which is inserted in the socket *b*, and that is to be let into the wood frame of the instrument, which usually receives the pegs or pins at one end of the string or wire; *c* is the clamp, (shewn also detached) made elastic and bell-mouthed. The end of the wire is to be inserted into the clamp *c*, and having slipped the forked part of it into the mortice-hole of the stem *a*, both the clamp and the wire is made fast by the screw *d*.

Fig. 11, is the clamp intended for that end of the wire which is to be drawn tight in tuning the instrument; *c* is a spring clamp, as before, which embraces the end of the wire, and being slipped into the mortice-hole of the box *a*, is made fast by the screw *d*; the clamp in this figure is formed at the end of the bar *e*, which passes through the carriage *f f*, having a screw thread at the end, (shewn detached below.) The stem of this carriage is inserted in the socket *b*, previously made fast to the frame of the instrument, and holds the wire; but when it is necessary to alter the tension of the wire, the screw-nut *g* is to be turned by a suitable key; and thus the tuning of the instrument is effected.

The patentee says, "The above method of fastening the wires is that which I prefer, yet I do not restrict myself to it, but occasionally use others, such as tapping the ends of the wires, and screwing them into a piece of metal, or flattening the ends of the wires, and inserting them into holes of proper metal, fitted for their reception. The clamps and screws above described, I have, by repeated trials, found to succeed best; but to whatever modifications of them may be made, I lay claim, as within the principle of my invention.

"By the mode of fastening the wire above described, I am enabled to use wire of any degree of temper, which, by the method of winding it round a peg or pin, as previously

observed, could not be done. Hence, I claim the exclusive privilege of using cast steel wire, hardened and tempered, and not hardened and tempered, and steel wire properly hardened and tempered; and though I prefer the former wire, yet I do not confine myself to the use of it alone."

[*Inrolled, August,* 1823.]

Original Communications.

To the Editor of the London Journal of Arts, &c.

SIR,

THE following extract, being an analytical examination of the peroxide of tin and of oxygen gas, is taken from a manuscript essay written in the year 1821, on *heat and light;* but which not having been published, may be acceptable to the readers of your Journal of Arts.

In taking the specific gravities of liquids and solids, water is the assumed unit, a cubic foot weighing 1000 ounces; the gases are all compared with hydrogen, the unit being one grain; oxygen dissolved in *fluidium,* or oxygen gas of equal bulk, weighs 15 grains; 100 cubic inches weighs 33'75 grains; and a cubic foot, or 1728 inches, will weigh 17'28 X 33'75=583'2 grains. One ounce is equal to 4375 grains, therefore the expression in ounces is 583'2

$$\overline{437,5}=1,330$$

specific gravity of water being	. .	1000
that of oxygen gas in same terms, is	. .	1'3330

But we have in this calculation no means of dividing the oxygen from the fluidium, consequently we know nothing of its specific heat, or the specific gravity of solid oxygen; if one of these results could be ascertained, we should easily arrive at the other.

Mr. Brande, in his manual of chemistry, states the specific gravity of tin . . . . . 7'3000
and of the peroxide . . . 7'000
with this data, we will endeavour to solve the problem.

The proportions of the peroxide are

Tin	55	call them	5'500
Oxygen	15		1'500

Then, as 7'300 is to 1 cubic foot, so is 5'500 to ,75 equal to three-fourths of a cubic foot, consequently the *oxygen* will occupy the remaining fourth of a cubic foot, which fourth part weighs 1500 ounces.

Then, as '25 is to 1500 ounces, so is 1 foot to 6000 ounces, *the specific gravity of the solid oxygen as it exists in the peroxide.*

Having ascertained the specific gravity of solid oxygen, we have now to discover the specific heat, or quantity of *fluidium* contained in fluid oxygen.

Specific gravity of solid oxygen, or ounces in the solid foot .	6000
specific gravity of oxygen gas .. .	1'3330

Then, as 6000 ounces is to 1 foot, so is 1'3330 to ,000222; or 222 decimal parts of a million, that is, if a cubic foot be divided into a million parts, the solid oxygen will occupy of those parts 222

Consequently the *fluidium* in some parts must be	999778
	1'000000

which is the quantity of fluidium or latent or specific heat, or by whatever name it may be designated, contained in a cubic foot of oxygen gas.

This result is so very wide from what we meet with in all the elementary works on chemistry, where the mathematics are combined with the subject, as to lead to a supposition that we are not occupied even in the same pursuit, and to which I am not aware of having seen any approximation.

I am, Sir, yours, &c.

JOSEPH LUCKCOCK.

Edgbaston, near Birmingham, Dec. 15, 1823.

ON PORTABLE GAS LAMPS.

Notwithstanding that we have several times expressed our disapprobation of portable gas lamps, and conceived (as we said on our last wrapper) that the subject had become uninteresting, we are still pressed with letters discusing the demerits of that invention, and calling upon us to repeat our remonstrances against its use. From among several other papers, we select the following, as containing matter of real importance to the public, and which we conceive will fully establish the correctness of those opinions which we ventured to advance upon a former occasion. (See vol. vi, pp. 254,316.)

To the Editor of the London Journal of Arts, &c.

SIR,

As you have taken some interest in the subject of portable oil gas, and have, in my opinion, very properly exposed its danger and inconvenience, I beg to relate to you a circumstance which occurred to me some time back, when making experiments on the compressibility of this material. I constructed a cylindrical vessel with spherical ends capa-

ble of holding about one gallon; it was of the stoutest tin plate that I could procure, and after making it sound, I braced it in every direction with bands, securely soldered throughout to the external part of the vessel. Into this vessel I forced through a stop-cock at its end somewhere about three times its natural volume of oil gas, making in the whole, I suppose, about four gallons. I brought this vessel in my arms, when charged, the distance of about thirty or forty yards, and being called away upon business, left it upon a work bench. After about twenty minutes, I heard a violent report, and immediately proceeding to the spot, found that the vessel had spontaneously exploded with such force, as to have raised a very considerable smother from the dirt and dust around the spot on which it had lain. One of the spherical ends which had been blown off, lay at a short distance, the cylinder itself was flattened out in a rude way, and the other spherical end with its stop-cock, weighing twenty-eight ounces, had been carried up nine feet, where it struck against an iron bar, and thence glanced obliquely through a sky-light to the distance of twenty feet. When picked up there was a dent in the pieces of metal, of half an inch deep, and more than three inches long, occasioned by the force with which it struck against the bar. I think it will not be doubted that if any person had been struck by this fragment of the vessel, thus projected by the explosion, that the effects would have been at least serious, if not fatal.

I have heard some of the particulars relative to the explosion at Old Ford, mentioned by Mr. Gordon, in his letter to your journal, from a person who saw the premises after the accident had occurred. I am not disposed to think of it as so extremely trivial as Mr. G. seems to treat it; fortunately no person was struck by any of the fragments of the vessel: as to the assertion that "wrought iron and copper vessels, when burst, do not fly in pieces, but rend like leather," and that they "could not possibly do any injury," is rather pre-

suming upon the flexibility of wrought metal, compared to the frangibility of cast metal. Has Mr. G. ever heard of the bursting of a wrought-iron gun barrel? and if so, have not such explosions, beside rolling up of the barrel like leather, sometimes carried away a man's hand, or a portion of his skull, or produced some such *trifling* effect? What Mr. Gordon means by the sudden explosion of sixteen feet of gas at the Old Ford works during his experiments at that place, is not at all obvious. Does he mean to say that he and another person were in the immediate vicinity of a vessel containing sixteen feet of gas under a compressure of thirty atmospheres, and that its burstings did them no injury? If so, we have no occasion for Prince Hohenlohe in this country. I am, Sir, yours, D. W.

SIR,

THERE is no danger to be apprehended from the explosion of portable gas lamps, *while the compression of the contained gas is greater than the external pressure of the atmospheric air.*—In that case neither the external air, nor, what would be of litttle moment *without it*, the flame, could be driven inwards. At the point, however, when the contained gas and the external air are at an *equilibrium* of pressure, if neither manual nor mechanical means are adopted to turn the stop-cock, it appears to be far from improbable that an explosion might take place. It would be advisable therefore for Mr. Gordon to direct his attention to this particular.

After the contained gas, and external air, are at an equilibrium of pressure, the gas will still continue to burn, though faintly,—so faintly as to be perhaps hardly perceptible. It may even become extinct, *from its own imbecility*. In that case, it is evident that, as the resistance of the contained gas decreases, the external air will gradually gain admission into the body of the lamp. Did this not

take place, a *vacuum* would be formed, which, in the present case, is obviously impossible. The atmospheric air, then, so entering and combining with the gas contained in the lamp, may form an *explosive mixture;* and if, under these circumstances, should another light pass near it, an explosion would appear to be inevitable. This, it must be confessed, pre-supposes the concurrence of several circumstances; but still it shows the *possibility of an explosion.* Such an occurrence is entirely prevented in the common gas works, by means of a constant pressure, day and night, at the gas station or fountion head. This constant pressure precludes the possibility of the external air gaining admission, so as to form an explosive mixture, with the carburetted hydrogen gas in the street mains.

That a dangerous explosion would take place, if the combination of carburetted hydrogen and atmospheric air should happen to be in the proportion of nearly 5 to 1, can be easily ascertained by so mixing these gases in a bottle, and applying a light to the mouth of it.—Safety may lie, it is true, in the explosive admixture not consisting of the proportions calculated to produce very powerful effects. This however is entirely *fortuitous*, and the accidental bursting of a vessel so charged, would cause an explosion, equal to that of gun-powder.

Your's, &c. T.

SIR,

UPON the subject of Portable Gas-lamps, which has been mentioned by you in the Journal for November and December 1823, I beg to relate a circumstance which occurred very recently, and which may not be generally known. In the Waterloo-road there is a large building called Zion Chapel, the managers of which were desirous of having portable oil gas to light the chapel for the Sunday evening

services; accordingly it was sent for and fairly tried, but after they had used it for two Sunday evenings only, they were obliged to discontinue, and immediately had the coal gas laid on from the South London company's main. Upon inquiring what were the objections and difficulties they complained of, I was informed they were these: It took a man's undivided attention to regulate the stop-cock, as there was no means of equalising the pressure or graduating the delivery of the gas to a nicety, consequently the flame was sometimes much too feeble, at other times as much too great, and occasionally it rushed with such impetuosity as actually to blow itself out, added to this the cost was very much greater than the coal gas. I believe you will find this substantially correct; I have also heard of several similar cases, which if you think necessary, I will send you particulars of, as I am as desirous of exposing the unjust pretensions and quackery of empirics, as of supporting inventions that are really beneficial.

Yours, truly, S. R.

After what has been said above, it is scarcely necessary to add any remarks of our own, but the inconvenience experienced during the lecture of Professor Millington, on Friday evening last, before the London Mechanics' Institute, was such as ought not to be passed unnoticed.

The chapel occupied by this institution was attempted to be illuminated by portable gas lamps, four of which were placed upon the table of the lecturer. The lamps consisted of a copper ball, apparently about twelve or fifteen inches diameter, from which arose an upright stem of about four feet, having the burner at top. A stop-cock at the lower part of the stem regulated the passage of the

gas, which was so extremely troublesome from the elasticity of the gas within the ball gradually diminishing as it became consumed, that the lecturer was interrupted every five minutes by the necessity of raising the flame, and after bringing all the lamps from different parts of the chapel on to the lecture table, they were ultimately dismissed, and their place supplied with candles. As all the lamps went out before they had burned two hours, it is probable that they had not been sufficiently charged; this might arise from precaution, as their form, and the situations in which they were placed, rendered them very likely to be overturned by accident, and falling from the considerable height at which they were stationed, would probably have so much bruised the vessel containing the compressed gas, as to have caused it to open, and with the expansive force of thirty atmospheres might have been attended with very serious consequences.—Editor.

OIL AND COAL GAS.

To the Editor of the London Journal of Arts, &c.

Sir,

Before entering, as I promised, on the particular history of oil gas works, I must first discuss a small demur that has been made since my last article appeared, regarding a point which seems to be every day assuming greater importance in the eyes of the public.

It has been urged that there are several *Country Towns* lighted with coal gas, which do not, more than the oil gas, pay a profit to their share-holders. For this many obvious reasons might be assigned. I shall content myself, however, by stating one or two of them only at present.

During the time that coal gas was more in its infancy,

than it now is, a certain class of individuals, tinsmiths, braziers, and plumbers, (all very decent good tradesmen, perhaps, in their own line), taking advantage of the rage for gas, erected gas works, as a matter of private speculation, at several places, out of all proportion, both in point of dimensions and expense, to their size, their local circumstances, or the peculiar nature of the trades carried on. Notwithstanding of which, these people always managed to dispose of their works to the *astonished natives;* and, in doing so, generally realized considerable sums of money, not unfrequently making a net profit on the sale of some of them, of from 80 to 90, and sometimes even 100 per cent.—Some of these works, which could not possibly cost, in their erection, above 5 or 6000l. have been known to fetch the speculator as much as 8, 10, and even 12,000l.; and this too at places where, unless the number of shops should be considerably increased, and the commodities they deal in become more adapted for show than they are at present, 500 private lamps must, in all probability, be the very utmost number that can be expected.

This being the case, it is evident that a gas work, at such places, whose profits would not be worth dividing on 12,000l., might, notwithstanding, make a very respectable dividend on 5 or 6000l. This species of abuse, however, argues nothing whatever to the prejudice of coal gas;—nor its intrinsic advantages (under a proper and judicious direction), the profit that *ought* to be derived from the manufacture of it. From a misdirected and narrow-minded desire of saving a few hundred pounds, the managing individuals of the gas works in a country town, in place of taking proper scientific counsel and assistance, have often, it is true, thrown themselves blind-fold into the arms of some half-taught rapacious contractor, (who, to make up for the lack of real talent, possessed per-

haps, a moderate proportion of low cunning, which answers his purpose sufficiently), and thus by literally *starting at straws, and jumping over mountains,*" have, in many instances, become, at last, the dupes of their own cupidity. *They* have, at the commencement, by perhaps saving 3 or 400l., *ultimately* lost as many thousands!

There have been instances where the contract to erect gas works, in a country town, has been evidently obtained (at a serious loss to the company) through the private influence and address of the contractor making one of the directors his *banker*, another his *attorney*, and so forth! Mal-management of this kind has been, even very recently, known to be carried on so far as *for two* contending contractors to unite forces, and divide the spoil between them, *by the one playing the part of contractor, and the other that of engineer to superintend him!!*

Under such flagrant tergiversations as these, it is quite clear that neither coal gas, nor any other gas whatever, could ever be expected to thrive.

But, *in contradistinction to all this*, it may safely be asserted, that where the directors have proceeded to work in a liberal, prudent, and business-like manner, coal gas works have generally paid well. I allude particularly to those places where the contracts to erect the works, have been undertaken by regular tenders, where a fair competition had taken place, and where a respectable and disinterested engineer, of talents and integrity, had been previously consulted, and whose plans and advice had been rigidly followed throughout—from the starting to the finishing of the works.

At such places, works have been erected at a price, and to an extent corresponding exactly to the size of the place, and as nearly as possible with the rental they could be expected to bring.

And now, to resume the thread of our subject;—it is

essential to keep in mind that, with the exception of a few oil gas works that have been erected by Mr. Deville, tinsmith in the Strand, the *patentees* of oil gas, have had, themselves, the entire and uninterrupted arrangement and management of nearly all the oil gas works that have been erected in this country; and therefore, if none of these works have yet prospered, so far as to make a division of real profit to their proprietors, the unavoidable presumption is that such *uniform failure*, during a period of five or six years, must have proceeded from some radical defect, either in the nature of the gas itself, or in the works.

It cannot surely be supposed that, like the early speculators in coal gas works before mentioned, the Patentees of the oil gas, from either a culpable degree of ignorance, or a want of prudent foresight; or, far less, *for the mere sake of a* JOB, have been guilty, on all occasions, of erecting works of too great an extent, and at too great an expense for the size of the places.

We shall presently look into these matters, however, as we survey the several oil gas works, and the towns, &c. at which they are erected.

I admit that it is unfair and absurd to judge, at all times, merely by the result of a thing, without combining and taking the whole circumstances also into account with it: but it must be allowed that it is very difficult to avoid pausing, and to get over, the very prominent and well established fact, that coal gas works do pay, *at many places*, but oil gas *at none*.

Yours,

A H.

(*To be continued.*)

Novel Inventions.

Perkins's Steam-Engine.

It was our intention to have remained silent upon the subject of Perkins's improved engine, until the ultimate experiments had been exhibited: but the repeated enquiries which are daily made relative to this interesting invention, induce us to communicate such information as we are enabled from time to time to collect. The public have doubtless considered that the silence which has for some time prevailed, upon this interesting subject, must be construed into a tacit acknowledgment that the project has failed. It is acknowledged that such an inference is warranted; but when a reasonable cause is stated, perhaps the nearly exhausted patience of the scientific world may, for a short time longer, be still kept from sinking. The fact is, that after all the endeavours which had been made to construct a generator, none had been produced, which would hold the steam under its great pressure, without very considerable leakage at the joints and rivets. This necessarily reduced the power which a perfect vessel would have been capable of exerting, and under these circumstances Mr. Perkins declined producing an imperfect experiment, which would have gone to the public as his ultimatum.

This difficulty is now removed, a generator having been at length produced, of wrought iron, without any seam or rivets, which has, we understand, been proved to sustain the enormous, and incredible pressure, of *twenty thousand pounds upon every inch of its surface.* This very extraordinary and unique piece of workmanship, has been made by Mr. James Russell of Wednesbury, and is considered by Mr. Perkins to have surmounted all his practical difficulties.

The objections which have been urged against this new engine, as to the little power it has been supposed to exert, have been met by Mr. P——, with some very extraordinary experiments, exhibiting its projectile force compared to gunpowder. A small apparatus has been constructed which we may call a steam-gun; this, when connected to the generator, was found to project bullets of the ordinary musket size, at a rate of 240 per minute, and with such force, that after passing through an inch deal, the ball in striking against an iron target, became flattened on one side, and spread out; the original diameter of the bullets were, 650 of an inch; when picked up after striking the iron target, they were plano convex 1,070 wide, and 0,290 thick.

It is presumed that these experiments (whatever may be the ulterior advantages of steam-guns,) are sufficient to prove that the steam produced by Mr. Perkins's new mode has suffiecient power to impel any machinery to which it may be adapted. We hope in our next, or at least at a very early period, to be enabled to speak satisfactorily of the steam-engine.

Method of Preserving Animals for the Illustration of Natural History.

A VERY interesting lecture on the modes of stuffing and preserving animals, to resemble life, was delivered on the 8th January, before the LEEDS PHILOSOPHICAL AND LITERARY SOCIETY, by C. Waterton, Esq. We have been several times gratified by ranging through the Museum of this youthful institution, and scarcely know how to express our admiration of the splendid and extensive collection of animals, and specimens of organic matter, which this Society possesses, through the liberality of its enlightened patrons. In viewing, however, the beautiful preparations of rare birds

and beasts collected in this Museum, and which appear to be still endued with life, we have regretted, that in a very short space of time their colours would be faded, their beauty gone, and their furry coats or plumage moulder into dust. It must have been, therefore, peculiarly interesting to this Society, and will be gratifying also to every student and admirer of natural history to learn, that the means are now discovered of preserving from decay the very semblance of the living beasts and birds which inhabit the most distant regions of the globe.

Mr. Waterton, (who has devoted much of his time to travelling, particularly in South America, and has acquired a very considerable collection of rare animals,) commenced his lecture by expatiating upon the advantages which science and the arts obtain from extensive museums of natural history, but lamented that the modes hitherto practised, of preparing animal specimens, had not been found effectual in preserving them from the ravages of moths. Mr. W. describes various experiments which he had made in the progress of his research, and at length the mode by which he had fortunately succeeded to his utmost wishes.

The chemical preparation employed was *alcohol* mixed in strong solution with *corrosive sublimate*, in which the skins of the beasts and feathers of birds were steeped; and the spirit being absorbed by all parts of the animal substance, carried the poisonous matter with it, which having saturated the skin and every fibre of the fur or feathers, totally precluded the possibility of any insect feeding upon it; as, of all poisons known, the corrosive sublimate is considered to be the most deadly to insects. The liquor being antiseptic, preserves the animal matter from decay, yet, being colourless, does not in the least injure the tint or texture of the most delicate specimen. Some of the specimens pro-

duced had been prepared in this way twelve years ago, and were seen to be still as beautiful and perfect as those recently killed.

The latter part of the lecture treated of the manner in which animals were usually stuffed with oakum or tow, by which they were made extremely heavy and ill-shapen, as well as inconvenient to remove; while, by his improved mode of stuffing, as was exemplified in the specimens exhibited, the anatomical character of the subject was accurately retained, and being made hollow, and capable of separating into parts, was light and conveniently portable.

For the purpose of dissection, a pen-knife and a hand not coarse and clumsy were required, and that was all: any man might learn the art in a week. In stuffing, it merely required cotton for the birds, and a piece of wood the size and shape of a knitting-needle. This was the mechanical apparatus. Mr. W. proceeded to give several important instructions as to the process of stuffing, and to expose the errors of the present system. He said, that the feathers ought to be kept close and smooth; that every bone should be taken out, to the very beak, instead of leaving in, as was usual, part of the skull; that wires should not be stuck into the birds, as neither their legs nor wings required it; that the orbits of their eyes, which usually increased in size, from the shrinking of the surrounding skin, should be reduced to their natural size by a needle and thread, before the eyes were inserted. If the preparation was not made soon after the death of the animal, the legs would shrivel, and the parts most thickly covered with feathers would dry in disproportion to the others. It was not wonderful, then, that the specimens found in the most celebrated collections in Europe were all defective. The grand discovery, however, was the solution, alcohol and corrosive sublimate. "This I communicated," says the lecturer, "some years

ago, to the Society of Arts and Sciences, who gave me at the time abundant applause; but being for the most part chemists, and feeling as if *they* ought to have made the discovery instead of myself, they evinced a spirit of jealousy, and submitted the plan to Mr. Bullock, the trading collector of museums, with whom it remained altogether unnoticed. Finding this, on my return from America, I broke off all correspondence with the Society, and have never communicated with them since"

Gas Burners.

The desire of avoiding trouble has in many instances been the source of useful inventions, and one has lately come to our knowledge which perhaps may be found of public utility. An errand-boy, in the service of Messrs. Morgan and Co., of Belle Savage-yard, Ludgate-hill, among other duties, had to light a gas-burner that was frequently extinguished by the wind from a door which was constantly opening and shutting near it. To remedy this inconvenience, and save himself the trouble of constantly attending to this burner, the boy placed a coil of iron wire over the flame, which kept it continually red-hot. Whenever the light was blown out, the gas immediately ignited again on coming in contact with the heated wire above it, and thus his labour became superseded. In windy weather the public are frequently inconvenienced by the gas lights in the streets going out, when the gas is expended to no purpose. This simple plan would, in those instances, no doubt prove effective, and we recommend it to the attention of the lamp contractors.

Electrical Apparatus.

Considerable inconvenience has been found to arise from the weak state of electric apparatus in damp or foggy

weather. To remedy this, Mr. Ronalds has introduced a small spirit lamp under the cushion of a cylindrical machine, and another under the prime conductor, which he states increases the power in a high degree; the machine by this means performing well, notwithstanding the unfavourable state of the atmosphere. Even in the summer season the machine is liable to be somewhat damp, and it is frequently set before the fire for the purpose of drying it.

At all favourable times we should recommend electrical machines to be placed so that the sun may shine upon them, as we have found by experience that the power of the machine is improved in a high degree by the action of the sun's rays.

Prevention of Dry Rot.

THE following remedy against dry-rot has been published by Mr. Baker, of Hampstead:—Take two ounces of white arsenic in powder, dissolve it by boiling in one gallon of soft water; if boiled in an iron or tinned vessel, add half an ounce of copper filings, but if in an untinned copper vessel, the filings are unnecessary; to a quart of size and half a pound of common tar, add a small quantity of fresh-slaked lime, sifted pretty fine; beat them well into a paste, which is to be dissolved with the above solution, gradually adding during the process (by small portions) as much more of the pulverized lime as will give the whole a proper (rather diluted) body, to be laid on with a painter's brush. New work when finished, as a preventive, should be dressed with the composition at least twice, after well drying the first coat.

Polytechnic and Scientific Intelligence.

Royal Society.

(*Continued from page* 108.)

Dec. 11.—W. Prout, M.D. F.R.S., read a paper on the nature of the acid and saline matter usually found in the stomachs of animals; and B. Powell, M.A. of Oriel College, Oxford, commenced reading an inquiry respecting the supposed heating effect beyond the red end of the spectrum.

Dec. 18.—A communication by J. Brinkley, D.D. P.R.I.A. F.R.S., was read on the North Polar distance of the principal fixed stars. This paper was apparently an attack on Mr. Pond's doctrine relative to a southern motion of the fixed stars. Dr. B. adduced the observations of Bradley, Cassini, Dr. Maskelyne, Piazzi, Mudge, and Lambton, and endeavours to show that the southern motion belongs entirely to the observations and instruments at Greenwich. He likewise complains that Mr. Pond has misrepresented his catalogues of 1813 and 1823 in his papers, and that they are even altered from their original form; for Mr. Pond, by applying Bradley's refraction, has diminished the quantities in Dr. Brinkley's catalogue, whilst those of M. Bessel are left just as they were, and his own is thus placed as a mean between them. Dr. B. has subjoined various tables to his papers, to confirm the points in dispute, and much impatience is evinced for their publication, as coming from so able an astronomer.

James Ivory, Esq. M.A. F.R.S., began a paper on the

figure requisite to maintain the equilibrium of a homogeneous fluid mass that revolves upon an axis.

Jan. 8.—Anthony M. R. Story, Esq. was admitted a Fellow, and part of a paper was read, entitled, "Observations on the Positions and Distances of 380 Double and Triple Fixed Stars, made in the Years 1821, 1822, and 1823, by J. F. W. Herschel, Esq. F.R.S., and J. South, Esq. F.R.S."

Jan. 22.—The President, Sir H. Davy, read a paper on the cause of the decay and corrosion of copper used for covering the bottoms of ships; in the course of which he pointed out an economical plan of remedying this great evil, which is produced by continued though weak chemical action of the saline particles of the sea-water on the surface of the copper, which is always eventually destroyed by it. He has ascertained, that if a very small surface of tin is placed in contact with a large surface of copper, it is rendered so negatively electrical, that the sea-water has no corroding effect on it; and when a small piece of tin was made to communicate with a large surface of copper by a wire, it was entirely preserved. This practical and highly useful discovery was deduced from the effect which electrical experiments have on chemical changes, which may be accelerated and retarded by that agent, as in the decompositions of earths, alkalies, &c.*

Sir H. Davy is now pursuing the subject, and reducing

* That the action of sea-water on the copper is galvanic, is indicated by the fact, that pure copper suffers comparatively little to that which contains a portion of any dissimilar metal. A vessel, some short time since, that had suffered materially in her bottom, being brought into port, a part of the copper was given to an able chemist, for the purpose of being analyzed, when it was found to contain a small portion of zinc; in one voyage the sheathing was entirely destroyed by the action of the sea-water.—Ed.

his ideas to practice on some of the vessels in the Royal Navy, under the sanction of the Lords of the Admiralty. The great advantage which this discovery will afford, not only to the naval service, but to our commercial and maritime interests in general, will be another addition to the number of useful discoveries which have so eminently distinguished the career of the learned President.

A paper was also read on the Developement of Magnetism in Iron and Steel by Percussion, Part II.; by W. Scores, junior, Esq. F.R.S.E.

Astronomical Society of London.

This Society commenced its meetings on the 14th of November, when a paper by George Dolland, Esq. F.R.S. and M. Ast. Soc. was read, describing a new instrument of his invention, constructed for measuring vertical angles by reflection and direct vision at once; and by which no less than thirty-two readings of each observation can be obtained from different portions of the divided limb.

12th Dec. 1823.—The papers read this evening consisted,

1st. Of a very able and elaborate preface written by J. F. W. Herschel, Esq. F.R.S. and For. Sec. Ast. Society, to a set of general tables, now printing by the Society, for computing the aberration and nutation of the forty-six Greenwich stars for ever. These tables are intended to appear in the ensuing volume of the Society's memoirs, which will shortly be published.

2nd. An appendix to a paper before read to the Society, on the theory of astronomical instruments, by Ben. Gompertz, Esq. F.R.S. and M. Ast. Soc. In this instance the author confines his attention to an investigation of the errors to which reflecting instruments for measuring angles are liable, and points out how they should be removed.

9th. Jan. 1824.—The papers read were

1st. Observations on the comet of 1811, taken at the Havannah by Don Joseph Joachim de Ferror, of Cadiz, deceased. This paper was communicated by Mr. Colebrooke, the President of the Society, and was accompanied by computations of the comet in an elliptic orbit, in which the elements accord very nearly with those brought out by M. Argenander.

2nd. On the constant deviation occurring in the reduction of astronomical observations, by Benj. Gompertz, Esq. F.R.S. and M. Ast. Soc.—In this paper the author gives several formulæ, relating to the compensation for aberration, nutation, refraction and other effects, to be allowed for in reducing observations, which he endeavours to simplify.

3rd. On the opposition of the planet Mars, which will take place on the 24th of March next; by Francis Baily, Esq. F.R.S. and V. P. Ast. Soc. To this paper we particularly wish to call the attention of our readers, as it relates to a very interesting phenomenon about to take place, and which only occurs but once in about 780 days. The author remarks that when Lacaille was at the Cape of Good Hope in 1751, he recommended the plan of making simultaneous observations of the same phenomena in both hemispheres of the globe, but since then, there has been no instruments in the southern hemisphere worthy of being compared with those of Europe. The case is now altered, for there are two excellent observatories actively employed in the south; and if they observe the present opposition, as no doubt they will, and it is observed at the same time in Europe from places previously identified, the parallax of Mars will be determined, and from that, the parallax of the sun may be deduced.—The observations which Mr. Baily recommends, are, that the distance between Mars and

certain fixed stars which he will approach at the time, should be accurately measured in a direct line by a micrometer when the planet is nearest to them; or else that the differences in right ascension and declination between the planet and each star should be taken, the place, and correct time of observation being at the same time noted down. He further observes, that unfortunately Mars will not pass any large stars at the time of this opposition, nor even any that are given in the catalogues of Bradley or Piazzi, but he will pass very near to five stars of the 7th and 8th magnitude, given in Lalande's catalogue inserted in the *Connoissance des Tems* for the years VIII. and XIII. and with which if the night is clear, the comparison may be made. The mean places of these stars on the 1st of January 1824, he gives as follows from the Connoissance de Tems, and the dates placed after them show when Mars will be in conjunction with each star.—The diameter of Mars will be 13″ 91′.

Right Ascension.			Declination North.			
12h.	10m.	0′	2°	18′	44″	April 1st. 1824
	14	29	1	52	2	Mar. 29th
	17	16	1	29	47	27th
	20	8	1	8	37	25th
	29	56	0	6	44	19th

Friday, February 13th, 1824.

This day being the fourth anniversary of the Society, a numerous meeting of the members took place at their apartments in Lincoln's Inn Fields, when a very satisfactory report upon the state of the society's affairs and proceedings during the last year, was read and ordered to be printed. This report paid a due tribute of respect to several members, which the society has lost by death in the

last year, and particularly to Col. Wm. Lambton of Madras, and Dr. Walbeck of the Observatory at Abö. It gives a succinct account of the measurement of the largest continuous arc of a meridian yet effected, which occupied the former gentleman upwards of twenty years in India.

The chairman (Mr. Colebrooke) then proceeded to distribute the honorary rewards of the Society, viz.:

The Society's Gold Medal to Charles Babbage, Esq., F.R.S., as a token of the high estimation in which it holds his valuable invention of an Engine for calculating the Mathematical and Astronomical Tables, being the first medal awarded by the society.

A similar Gold Medal to Professor I. F. Encke, director of the Observatory of Seeberg in Gotha, for his investigations relative to the comet which bears his name, and which led to the re-discovery of it in 1822. The Silver Medal of the Society to Professor Charles Rumker, for the re-discovery of Encke's comet, and a similar medal to M. Jean Louis Pous, of La Marlia in Italy, for the discovery of two comets on the 31st May, and the 13th July, 1822, and for his indefatigable assiduity in that department of Astronomy. The chairman prefaced the presentation of each medal by a most eloquent, learned and interesting address of considerable length, all of which were delivered in the most impressive manner. They were replete with information on the successive improvements in machinery for assisting calculation, as well as on cometary astronomy, and we were happy to find that in consequence of a motion made by Davies Gilbert, Esq., M. P. and seconded by John Fuller, Esq., they will be printed for circulation amongst the members.

The election of the officers and council for the ensuing year then took place, when the following appeared to be the unanimous choice of the meeting, viz:

As President.—Henry Thomas Colebrooke, Esq., F.R.S. L. and E and F.L.S.

As Vice-Presidents.—Charles Babbage, Esq. M.A. F.R.S. L. and E.: Francis Baily, Esq. F.R.S. and L.S.; Sir Benjamin Hobhouse, Bart. F.R.S. and The Right Hon. George, Earl of Macclesfield, F.R.S.

As Treasurer.—Rev. William Pearson, L.L.D., F.R.S.

As Secretaries.—Olinthus G. Gregory, L.L.D. Prof. Math. Roy. Mil. Acad. Woolwich; John Millington, Esq. F.L.S. Prof. Mech. Phil. Roy. Inst.

As Foreign Secretary.—J. F. W. Herschel, Esq. M.A. F.R.S. L. and E.

As Council. —Major Thomas Colby, Roy. Eng. L.L D. F.R.S., L. and E.; George Dollond, Esq. F.R.S.; Bryan Donkin, Esq.; Captain John Franklin, R.N., F.R.S.; Davies Gilbert, Esq. M.P., V.P.R.S., F.L.S.; Benjamin Gompertz, Esq. F.R.S.; Stephen Groombridge, Esq., F.R.S.; Daniel Moore, Esq. F.R.S., S.A. and L.S.

Several new members and associates were nominated, and the greater part of the society adjourned to Freemasons' Tavern, where a dinner was provided.

Society of Arts.

Since our last notice of the proceedings of this Society, the attention of the respective committees has been directed to the investigation of the following subjects.

Committee of Polite Arts.

Specimens of Rose-engine Turning;—An Etching on Slate;—A Model of St. Martin's Church;—An Improvement in Etching.

Committee of Mechanics.

A proposition for an universal standard of measure, derived from the descent of a cylinder down an inclined plane;—a mode of hanging the running-stone of a corn-mill;—a proposition for the extinction of accidental fires, a small case of gunpowder is inclosed in a vessel of water impregnated with saline or other anti-combustible ingredients, and is placed in any or every apartment, in which if a fire happens, it communicates by means of a quick match with the gunpowder, which, by its explosion, scatters the water about and extinguishes the fire:—an improvement in building small vessels for swift sailing; the masts are suspended on a strong axis running along the deck, and are kept upright by a large counterweight at the lower end: the shrouds, in place of being attached to the sides are made fast to a cross piece, which is united to the mast at the level of the deck, consequently allowing the mast to deviate from a vertical position without affecting the stability of the hull, thereby affording an opportunity of building vessels much narrower than usual;—an American hand-board, being simply a piece of mill-board, thickened at one end; the thin end is placed between the leaves of a book to afford support to the hand when writing at the bottom of a page:—a secret lock on the old plan of lettered cylinders:—a fire-escape; a strong staple is fixed into the upper part of the front of every house, and when a fire occurs a pulley is to be hooked into staples in front of the adjoining houses, and the two ends of a rope (having a basket attached to its middle) being passed through the pulleys, affords an opportunity of raising the basket to any of the windows, for the reception of the inmates:—a steel mill for grinding corn, in which the upper plate is held down by screws, by which it may be removed to clear away any extraneous matter:—copper-chains, as a substi-

tute for the limber ropes in ships:—a Safe Coach or Caravan:—a Plan for propelling Boats by Paddle-wheels worked by men on board:—a Circular Saw driven by a windmill;—a Method of releasing the Fid of a top mast without slacking the upper shrouds: the ends of the fid are supported on two inclined planes, which, (when the heel rope has been set tight) are withdrawn by two powerful jacks, and the fid being removed, the mast is lowered as usual;—another Method in which a pair of counter wedges are substituted for the fid, the advantages of which is, that the wedges may be driven back at either end;—a Binnacle Lamp contained in a distinct lantern, to allow of its being used for other purposes;—an Ice Boat furnished with wheels, which may be converted into paddle wheels for the ordinary purposes of navigation, when requisite;—a Pitch Kettle and Ladle;—a Method of supporting the ends of decayed Girders, by the application of cast-iron parallelograms, bolted or keyed to the timber, the ends of the iron resting on the wall-plate;—a Secret Lock, in which false notches are cut in the ordinary revolving lettered cylinders;—a Method of Sweeping Chimneys;—an Umbrella for Open Carriages, suspended from an iron arm affixed to the back of the seat:—Two German Boring Bits; a Proposal for warming Manufactories, &c.:—a Portable Scaffold or Elevator, on the principle of the lazy-tongs;—a Gate in which the stop at bottom against which it shuts is drawn down flush with the ground, as the gate opens, thereby removing the stumbling-block, which the ordinary stop presents to the horse's feet;—a Lathe Chuck, composed of a series of concentric frustrums of hollow cones, contained in an ordinary cup chuck.

Joint Committee of Mechanics and Chemistry.

A Method of consuming the Smoke of Steam-engine Furnaces; the coals are supplied through a close hopper,

and a supply of fresh air is introduced at the bridge through the whole length of the fire-bars which are made hollow for that purpose.

Committee of Colonies and Trade.

Specimens of Silk from the Isle of France;—East Indian Annotta;—a Claim for eradicating stumps of Trees.

Committee of Chemisty.

Wine made from Potatoe-berries;—an Alloy for casting, consisting of Iron, Copper, Nickel, &c.;— a Method of supplying Casks containing fermenting Liquors, by an inverted vessel of the same fluid, the orifice being immersed in the contents of the cask, similar to the ordinary bird-fountain;—an improved process of Dressing Horse Hides, for the purposes of dying;—a pink dye;—an Application of the excrement of Caterpillers which feed on Roses.

Committee of Agriculture.

Claims for the respective premiums;—Sowing Acorns;—Gaining Land from the Sea;—Improving Waste Land;—British Opium;—a Drill Hoe.

London Mechanics' Institution.

This Society may now be considered as an organized body, having formed a code of laws, elected officers, and commenced their operations by a course of lectures on the elementary principles of the mechanical arts.

The objects proposed are to initiate the untutored mechanic in the principles of science and art; to effect which object, the voluntary association of the working classes o. society is proposed, and on their payment of a small sum per annum, they will be admitted to the several courses or lectures, which are to be delivered upon different branches of science; to the use of a library of scientific books; and

to the schools of theoretical and practical mechanics, which are about to be formed.

It is gratifying to find that a part of the plan proposed by our correspondent G.D.B. in September last, (see Vol. VI. page 198.) the "*formation of a new Society for the advancement of practical knowledge*" has been so soon taken up and prosecuted with so much promptitude. We shall not stop to discuss the propriety of certain points, which the projectors of the new institution appear to have overlooked, but wishing every success to the undertaking, give it our most cordial support.

The most eligible place which has hitherto offered for the meetings of the Mechanics' Institution, is a chapel in Monkwell-street, near Cripplegate, where the first assemblage of the members took place on Friday evening, 20th of Feb. for the purpose of hearing a lecture on mechanical philosophy, by Professor Millington.

Previous to the lecture, Dr. Birkbeck the president, delivered a very excellent and animated introductory oration, in which he pointed out the objects of the society and its advantages to those who embraced them; the Dr. commented upon the mistaken views which some of the periodical writers have taken relative to the objects of this institution, and declared that the only designs which he and the rest of the projectors had in view, was to extend the knowledge of the practical science among the labouring classes of society, and to wean them from depraved and grovelling habits.

Professor Millington then commenced his elementary lecture, and introducing himself to the society, stated that he had risen to the situation which he now has the honour of filling, merely by his assiduity without the advantages of a liberal education; and having been himself a workman and the superintendent of others, presumed that he was not unacquainted with the wants of those who heard him.

The rudiments of mathematics where then explained with a simplicity of style and manner that at once descended to the understanding of the tyro without offending the ears of the proficient. The inseparable union of chemistry with mechanics throughout the manufacturing arts was then pointed out, and examples adduced, by which a knowledge of the one gave an important aid to the other. Some of the properties of matter were then described as its indestructibility, change of character, divisibility and weight, which where illustrated by several luminous experiments.

After the conclusion of the lecture, Dr. Birkbeck congratulated the Society on its promising advancement, and stated that *thirteen hundred members* had already subscribed their names, and though the funds of the Institution did not at present exceed *seven hundred pounds*, yet he flattered himself that at no very distant period, they should assemble in a more suitable place, and under their own roof.

New Patents Sealed, 1824.

To Thoms Bewley, of Mount Rath, in Queen's County, Ireland, Cotton Manufacturer, for his invention of certain improvements in Wheeled Carriages.—Sealed 24th Jan. Six Months.

John Heathcoat, of Tiverton, in the County of Devon, Lace Manufacturer, for his invention of certain improvements in the method of figuring or ornamenting various descriptions or kinds of goods manufactured from Silk, Cotton, or Flax.—24th Jan. Six Months.

To John Jones, of Leeds, in the County of York, late of Gloucester, Brush Manufacturer, for his invention of certain improvements in machinery, and instruments for dressing and cleansing Woollen, Cotton, Linen, Silk, and other Cloths, or Fabricks; and which improvements are also applicable to the dressing and cleansing of machinery of various descriptions, and other articles or substances.—27th Jan. Six Months.

To Sir Wm. Congreve, of Cecil Street, Strand, in the County of Middlesex, Bart. for his invention of an improved method of Stamping.—7th Feb. Six Months.

To John Arrowsmith, of Air Street, Piccadilly, in the County of Middlesex, Esq. in consequence of discoveries by himself, and communications made to him by certain foreigners residing abroad, for an improved mode of publicly exhibiting Pictures, or Painted Scenery of every description, and for distributing or directing the day-light upon or through them, so as to produce many beautiful effects of light and shade, which be denominates Diorama—10th Feb. Six Months.

To Robert Lloyd, of the Strand, in the County of Middlesex, Hatter; and James Rowbotham, of Great Surry Street, Blackfriars Road, in the County of Surry, Hat Manufacturer, for their having invented and brought to perfection, a hat upon a new construction, which will be of great public utility.—19th Feb. Six Months.

To Henry Adcock, of Summer Hill Terrace, in the Parish of Birmingham and County of Wawrick, Gilt Toy Manufacturer, for his invention of an improvement in making Waistbands, or Umbilical, Ventrical, *Lumbar*, and Spinal Bandages, or supporters to be attached to Coats, Waistcoats, Breeches, Pantaloons, and Trousers, to be either permanently fixed, or occasionally attached and supplied.—19th Feb. Six Months.

To William Church, of Birmingham, in the County of Warwick, Esq. for his invention of certain improvements in machinery for Printing.—19th Feb. Six Months.

To Augustus Applegath, of Duke Street, Stamford Street, Blackfriars, in the County of Surry, Printer, for his invention of certain improvements in machines for Printing. 19th Feb. Six Months.

To the Rev. Moses Isaacs, of Houndsditch, in the City of London, for his invention of certain improvements in the construction of machinery, which, when kept in motion by any suitable power or weight, is applicable to obviate concussion, by means of preventing counteraction, and by which the friction is converted into an useful power for propelling Carriages on Land, Vessels on Water, and giving motion to other machinery. 19th Feb. Six Months.

To John Vallance, of Brighton, in the County of Sussex, Esq. for his new invented method of communication, or means of intercourse, by which Persons may be conveyed, goods transported, or intelligence communicated from one place to another with greater expedition than by means of Steam Carriages, Steam or other Vessels, or Carriages drawn by animals.—19th Feb. Six Months.

CELESTIAL PHENOMENA, MARCH, 1824.

D.	H.	M.	S.	
3	0	0	0	Clock 12′ 11″ before ☉.
5	21	45	0	☽ and ♄ in conj. long. 18° 57′ in Taurus ☽ lat. 4° 18′ N. ♄ lat. 2° 1′ S. Dif. of lat. 6° 19′.
6	0	0	0	☉ declination 5° 34′ S.
7	0	0	0	♀ in her descending node.
8	2	10	0	☽ in □ first quarter.
8	0	0	0	☿ in aphelion.
9	1	15	0	☽ and ♃ in conj. long. 1° 17′ in Cancer ☽ lat. 1° 20′ N. ♃ lat. 0° 5′ N. Dif. of lat. 1° 15′.
10	0	0	0	Clock 10′ 29″ before ☉
12	0	0	0	☉ declination 3° 13′ S.
13	7	0	0	☽ in Perigee.
14	17	37	0	Ecliptic opposition ☉ Full moon.
15	15	15	0	☽ and ♂ in conj. long. 7° 50′. in Libra ☽ lat. 4° 56′ S. ♂ lat. 3° 25′ N. Dif. of lat. 8° 21′
17	0	0	0	Clock 8′ 30″ before ☉
18	0	0	0	☉ declination 0° 51′ S.
20	3	32	0	Vernal Equinox ☉ enters Aries.
21	23	11	0	☾ in □ last quarter.
24	0	0	0	Clock 6′ 23″ before ☉
24	16	0	0	Opposition of ☉ and ♂
25	0	0	0	☾ in Apogee
26	0	0	0	☉ declination 2° 18′ N.
27	7	0	0	☾ and ♀ in conj. long. 5° 1′ Pisces, ☾ lat. 3° 49′ N. ♀ lat. 0° 57′ S. Dif. of lat. 4° 46′.
28	22	15	0	☾ and ☿ in conj. long. 25° 2′ in Pisces, ☾ lat. 4° 40′ N. ☿ lat. 2° 20′ S. Dif. of lat. 7° 0′
28	0	0	0	Clock 5° 9′ before ☉
30	3	2	0	Ecliptic Conjunction ● New Moon.
31	0	0	0	☉ declination 4° 15′ N.

The waxing moon ☽—the waning moon ☾.

METEOROLOGICAL JOURNAL, JAN. AND FEB. 1824.

1824.	Thermo.		Barometer.		Rain in inches.	1824.	Thermo.		Barometer.		Rain in inches.
	Higt.	Low.	+	—			Higt.	Low.	+	—	
JAN.						FEB.					
26	53	42	30,04	29,99	. .	10	53	32°	30,32	30,15	. .
27	51	40	29,79	—,62	. .	11	46	35	,21	—,18	,025
28	47	33	,56	—,45	. .	12	48	30	,98	29,49	,075
29	43	34	,92	—,61	,15	13	45	30	,26	28,95	1,12
30	38	25	30,03	—,92	. .	14	43	30	,15	—,79	. .
31	41	26	29,92	—,81	. .	15	42	31	,49	29,28	. .
FEB.						16	40	25	,52	—,49	. .
1	45	27	,86	stat.	. .	17	41	25	,38	—,81	. .
2	40	25	30,04	29,95	. .	18	46	28	,34	—,25	,025
3	40	25	,03	—,87	. .	19	46	28	,35	—,33	,1
4	46	38	29,67	—,63	,05	20	43	37	,54	—,39	,325
5	42	33	,79	—,69	,1	21	42	34	,86	—,64	. .
6	43	31	30,02	—,89	,05	22	47	31	,79	—,77	. .
7	50	39	,09	30,01	. .	23	44	31	,89	—,88	. .
8	54	44	,22	—,09	. .	24	41	31	,90	—,70	. .
9	53	44	,39	—,26	,025	25	47	35			. .

Lower Edmonton. C. H. ADAMS.

LITERARY AND SCIENTIFIC NOTICES.

Polar Voyage.—The Journal of the last Polar Voyage is announced for publication on the 27th of March. It will be printed in a uniform manner with the preceding volumes, and contain 13 maps beside 26 finely finished engravings from the drawings of Capt. Lyon, one of the officers of the expedition.

The Componium.—A musical instrument under this name has been exhibited at Paris. It is also called a Musical Improvisator; and is a kind of barrel organ. The distinguishing features of novelty are, that it not only performs the pieces of music marked upon it, but that it *improvises!* A theme being written on the barrel, the componium plays it over, that it may be familiar to the auditor, and then, being left to itself, without any external impulse, it executes an infinity of variations on the same theme; and let the variations be ever so complicated, they are always in unison with the rules of composition.

The Rev. W. S. Gilly has announced a work in quarto, being a narrative of an excursion to the Mountains of Piedmont, and researches among the Vaudois, with illustrations of the interesting history of those Protestant inhabitants of the Cottian Alps, and an appendix; containing documents from ancient MSS.

Mr. Charles Westmacott is about to publish a work on the British Galleries of Art, with a critical and descriptive catalogue to each collection, and a history of the choicest treasures of the Fine Arts, ancient and modern, distributed in the public and private galleries throughout the kingdom.

Pompeii.—A volume in folio, with 107 plates, has lately been issued by the Royal Printing Office at Naples, it is appropriated to the description and delineation of the decorations of the walls and pavements of rooms in ancient Pompeii; among the embellishments will be found six plates occupied in representing the arenas of the amphitheatre now destroyed, and also representations of Arabesque, Mosaic, and other ornaments found in the ancient houses of that city. Many of the groups and compositions are highly interesting to the architect and the antiquary, as they partake of that beauty in their design and execution for which the ancients were so justly celebrated.

A German Grammar, on a plan entirely new, and particularly adapted to the use of the English student, is in the press, by J. Rowbotham, of the Classical Academy, Walworth. This is a desideratum at the present time, as it may facilitate the attaining of that language, and thereby enable us to see works in their original tongue, and not through the deteriorated medium of translations.

Lithocramy.—An exhibition has been opened at Paris, of works produced by a Monsieur Malapeau; this new process is performed by painting in oil on stone, and printing impressions on stained canvas, similar to pictures. The French virtuosi are very much divided in their opinions of the merits of these productions; some praise them highly and others universally condemn them. The latter class entertain a suspicion that the effect, indifferent as it is, is produced by the pencil after the impression is worked off.

The Northern Expedition.—It is presumed that the new expedition will sail about the middle of May, as all the instruments to be used by Capt. Parry and the other navigators are ordered to be shipped by the first of the month.

Statue of Knox.—A fund is about to be raised at Glasgow, by public subscription, to be appropriated to the erecting a doric column, surmounted by a statue, to commemorate John Knox the reformer, it is to be placed in the Fir Park.

Olympia.—A work is preparing for publication by Mr. J. S. Stanhope, in imperial folio, enriched with numerous engravings by the most able artists, from drawings by Mr. Derwint, entitled as above. It is a topography illustrative of the actual state of Olympia and the ruins of the city of Elis.

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No. XL.

Recent Patents.

To George Clymer, *of Finsbury Street, Finsbury Square, in the County of Middlesex, Mechanic, for his Invention of certain Improvements on Agricultural Ploughs.*

[Sealed 5th July, 1823.]

These improvements on ploughs consist first, in forming the breasts, or mould-boards of the ploughs in peculiar manners, applicable to different soils, their curved surfaces being generated by certain mathematical rules, the object of which is to diminish the friction caused by the resistance of the ground, in a greater degree than has been heretofore effected by any of the ploughs in use; secondly, in the construction of a peculiarly formed beam, with its modes of adjustment; by means of which, different widths as well as depths of furrow may be cut, and the plough drawn by a single or double team.

Plate IX. fig. 1, represents one of the improved ploughs as seen in perspective on the breast side: this form of mould-board, or breast, is particularly designed for light land. Fig 2, exhibits another form of plough, the curve of the mould-board, or breast, of which is suited to stiff or wet land. As the peculiar curve of the breast is of main importance, the modes of forming the wooden patterns from which they may be cast, is particularly set out on mathematical principles.

To construct the breast of a plough as shewn in fig 1, the following means are adopted: take a rectangular block of wood, say thirty-six inches long, eighteen inches wide, and twelve inches deep; this block may be supposed to be represented at fig. 3. *a, b, c, d,* is the top surface. From the angle *a,* to *e,* about two inches from the angle *c,* a diagonal line *a, e,* is to be drawn, which line represents the ultimate top edge of the mould-board, from the colter *e,* to the tail at *a*; and *b, c,* is the land side. On the under surface of the block now draw the line *f, g,* shewn by dots, parallel to the land side, at nine inches distant from *b, c,* which is to form the width of the furrow. Cut out of the side of the block, the rectangular prism *a, h, i:* and then by cutting in the line *g, h,* parallel to the land side, sever the oblong block *i, h, g, d.* A perpendicular section is now to be cut in the line *h, e,* descending from the point *h,* on the top surface of the block to a point *e,* in the land side near the bottom of the block; a lateral section is also to be cut from the point *h,* at the top surface in the line *g, c,* at the bottom of the block, which cut will incline about 25 deg. from the horizontal or top surface, and by being carried on to meet the perpendicular cut *h, e,* will sever a pyramidical portion of the block contained within *h, e, c, g.* The part of the block which is to form the shear must now be rounded from the line *h, g,* to the point *c,* in an easy curve.

Fig. 4, represents the block as it would appear in perspective after being cut in the manner before described, and to which figure the further description will refer. Graduate the oblique line *h*, *c*, by any scale of equal parts, and draw faint lines (by means of a square) upon the oblique surface *z*, and also continue these lines perpendicularly upon the curved side *f*; from each graduation in the line *h*, *c*, cut right lines to the graduations at the bottom edge of the curved side *y*, as shewn by dots, and when this is done, the portions of wood are to be carefully removed (by means of a chisel,) so as to preserve the line of each cut, and the surface being smoothly planed, a gradual curved inclination of the breast will be produced, rising from the horizontal commencement of the shear at *c*, to the perpendicular part of the mould-board at *h*, *h*.

The hinder or tail part of the mould-board is formed by laying down similar graduations on the lines *f*, *h*, upon the upper and under surfaces of the block, and drawing faint lines as at *x*, then cutting right lines in the block from the graduated points on the edge *a*, *h*, to the corresponding gradations in the line *f*, *h*, on the under surface of the block. The portions of wood between each cut being now removed as before directed, and the surface rendered smooth, a model of the mould-board or breast of a plough will be produced on mathematical principles, calculated to operate in dry hard ground, with less resistance, and more ease than any other construction of plough heretofore adopted.

For ploughing very wet and stiff ground, another form of breast, or mould-board, is proposed, as at fig. 2, the model of which is to be constructed in the following manner: provide a rectangular block of wood of the same dimensions as before, of which fig. 5, may represent the top surface; *a*, *b*, *c*, *d*, its corners. At about ten inches from the angle *c*, mark the point *e*, in the land side, and draw the

diagonal line *e*, *a*, across the top surface of the block; then graduate the line *b*, *e*, into equal parts, and draw at right angles, the faint lines to the edge of the diagonal *a*, *e*. On the bottom surface of the block draw the line *f*, *g*, shewn by dots parallel to the land side, and at about nine inches from it, rounding the part which is to form the share by a gentle curve towards the point *c*; now graduate this line *f*, *g*, and the curve on the under side of the block into equal parts; and then cut right lines into the block from these graduations on the under surface, to the graduations in the line *a*, *e*, on the top surface, which cuts are to incline obliquely at an angle of about 45 deg. from the base line, and are to be parallel to each other, as shewn in the side view of the block fig. 6. The portions of wood between each cut must now be removed by a chisel as before described, and when the surface is rendered smooth, it will have assumed the form of the mould-board, or breast of the plough shewn at fig. 2.

The inclination of every part of the surfaces of these breasts, or mould-boards, rises so uniformly progressive from the commencement of cutting the horizontal furrow, to the raising of the clod into a perpendicular position, and ultimately turning it over, that the least possible resistance is opposed to the progress of the plough, the force exerted in pressing laterally and lifting the clod, being equally divided.

Having described the mode of generating the curves suited to these improved ploughs, the specification proceeds to explain the other parts of the plough, and the new mode of regulating the draught, which latter contrivance consists in a peculiarly formed beam and its appendages. In fig. 1, *a*, is the breast; *b*, the beam; *c*, the colter; *d*, the colter point; *e*, the share; *f*, so much of the land side of the plough as can be seen in the view. Fig. 7, is the beam detached and seen on the top side. Fig. 8, is the land side of the plough on the reverse of fig. 1; *g*, is the sole attached by bolts and

nuts. Fig. 9, represents the inner part of the land side, with the colter *c*, detached, and the colter point *d*, as seen on the under side; fig. 10, is a front view of the head of the land side, shewing the rest or cross piece on which the beam is supported.

In putting the parts of the plough together, screw-bolts are passed through the holes *i*, and *k*, which are made fast by nuts; an iron strap with nuts, secures the back part of the mould-board and the land side together. The colter *c*, which in the plough fig. 1, is attached to the breast, slips in between the mould-board and the land side, and is secured by the bolt *i*; the share *e*, is attached to the breast by bolts, much in the usual way; and the colter point *d*, is held by the long bolt *m*.

The beam *b*, rests upon the cross pieces *n*, *n*, extending from the head of the land side, and is secured by a bolt passing through at *o*, as seen in fig. 1. The hinder part of the beam is secured by a pin passing through it, and one of the several holes in the land side at *p*. Thus it will be seen, that while the fulcrum point at *o*, is fixed, the hinder part of the beam may be raised or lowered by shifting the pin *p*, to either of the holes, consequently the line of draft will form a greater or less angle, with the horizon according to this adjustment, and will thereby plough a deeper or shallower furrow. The adjustment in a lateral direction, is effected by placing several rings upon the bolt *o*, between the sides of the beam and the head of the land side, as shown by the front view of that part at fig. 10. By shifting these rings, the direction of the beam will form a greater or less angle with the land side, and by that means a broader or narrower furrow will be produced; the plough may also be in this manner adjusted to suit a single or double team.

The general construction of the plough, fig. 2, and the modes by which its parts are put together, are nearly similiar

to fig. 1, above described, with the exception of the mould-board. To this plough, however, it is found advantageous in wet ground to employ a colter of the old kind, which is attached to the plough by means of an elongation of the head, extending from the land side. By a similar contrivance a colter of this sort may be employed to a plough of the first description; but in dry hard land it has not been found necessary. Also a colter attached to the breast, as *c*, fig. 1. may be adopted to fig. 2, if desired, but that has been generally found to be of little or no advantage. In the plough shown at fig. 2, the share and the colter point, are in one piece, as at fig. 11; when this description of share is employed it is held on by the bolt *m*, as described at fig. 9.

The specification states in conclusion, that, as many parts have been necessarily described which are not new, the claim of the patentee, is confined to the peculiar manner of generating the breasts, or mould-boards, of this improved plough as above explained: and also in the construction of the beam and its appendages, by means of which the draft of the plough may be adjusted to produce any required depth and width of furrow; and lastly, in the peculiar manner in which the colter, colter-point, and share are affixed to these ploughs.

[*Inrolled January*, 1824.]

There are two modes of generating the curved surface of a mould-board upon mathematical principles, which have already been published to the world, the one by Mr. Amos, in the Transactions of the Agricultural Society, the other by Mr. Jefferson, of America; but these are both essentially different from the plans proposed by Mr. Clymer, and neither of them produce a curve, by any means so well calculated to diminish friction, and avoid the resistance of

the soil, as that above proposed, we believe we are authorised to say from the testimony of practical agriculturists, that Mr. Clymer's plough turns the furrow with less resistance than any other plough heretofore employed.—EDITOR.

To WILLIAM VERE, *of Crown Row, Mile End Old Town, in the Parish of Stepney, and County of Middlesex, Engineer, and* HENRY SAMUEL CRANE, *of Stratford, in the Parish of West-Ham, in the County of Essex, Manufacturing Chemist, for their Invention of certain Improvements in the manufacture of Inflammable Gas.*

[Sealed 30th June, 1823.]

A GREAT inconvenience has hitherto been experienced in the production of carbonated hydrogen gas, for illumination, by the tar which rises with the gas during the distillation, afterwards depositing itself upon the inner surfaces of the tubes through which the gas is directed, so as to clog them, and ultimately close up the passage. To remedy this inconvenience, many expedients have been tried, but upon the whole they may be considered to have proved ineffectual, and hence coal tar, which is capable, if perfectly decomposed, of producing a gas extremely pure and brilliant when ignited, hasfrom its adhesive properties been rejected as almost useless. The object of the patentees, is to effect a perfect decomposition of the tar, and this is done by subjecting the gas as it rises from the retort, to the action of steam, which causes an immediate precipitation of the carbonaceous matter, and enables the gas to pass on in a perfectly volatile state.

Plate IX. fig. 12. is the section of a furnace with a retort, applicable to the distillation of coal, coal-tar, oil, and such other matters as are capable of giving out carbonated hydrogen gas, for the purpose of illumination:— *a* is the furnace;

b, b, the flues; *c*, the retort closed by a mouth-piece in the usual way; *d* is the exit-pipe through which the gas passes to the gasometer; thus far the apparatus is similar to that usually employed for the distillation of coal. The improved part of the apparatus, is particularly designed for the decomposition of coal tar, and is constructed as follows: *e* is an iron dish or tray placed near the mouth of the retort *f*, a pipe for conducting tar from a cistern *g*, into the dish within the retort, when the heat of the furnace decomposes the tar, and it passes off through the exit-pipe *d*. A cistern of water is placed at *h*, from whence the water is allowed to flow through the pipe *i*, into the end of the retort.

The retort is to be nearly filled with coke, broken bricks, or any other materials, that will afford a depositing surface for the carbonaceous residum of the gas, and being secured and luted at the mouth, the retort is raised to a bright red heat; water is then to be admitted into the retort, by turning the cock of the cistern, *h*; when on entering, it immediately becomes converted into steam. The tar to be operated upon, is now allowed to pass from the cistern *g*, through the pipe *f*, into the dish *e*. Here the intense heat converts the tar into gas, which in passing off by the exit-pipe, constantly meets with a current of steam, produced by the decomposition of the water. By these means, the impurities which rise with the gas become precipitated, and deposit themselves upon the materials within the retort, and the gas passes off free from the carbonaceous matters, which would otherwise adhere to the pipes, or produce soot when the gas is burning.

This process is carried on without interruption, the supply of tar and of water being continued, and the quantities adjusted as circumstances shall dictate; which can only be known by observation and experience. The coke, brick-bats, and other materials, used as a depositing surface, must

be occasionally removed, and fresh materials supplied; perhaps this may be necessary every twenty-four hours. The tray or dish *e*, must also be removed whenever it becomes filled with carbonaceous matter, and a clean one placed in its stead.

When the application of a current of steam is deemed desirable to assist the purification of gas, produced immediately from solid dry materials, then the water is to be introduced through the pipe *f*, and the steam thereby allowed to pass through the retort.

The invention herein claimed consists "entirely in the application or admission of a continued stream of water, or of a constant current of steam, (produced by the evaporation of water) into the retort, or other vessel, where coal, coal-tar, tar-oil, animal oil, vegetable oil, or other suitable material, is under the process of decomposition, for the purpose of producing inflammable gas."

[*Inrolled December*, 1823.]

To Thomas Greenwood, *of Gildersom, near Leeds, Machine-maker, and* Joseph Thackrah, *Surgical Mechanist of Leeds, both in the County of York, for their Invention of certain Improvements on, or Substitutes for, Pattens and Clogs.*

[Sealed 27th December, 1823.]

These improvements consists in making the soles of pattens and clogs of elastic materials, by which they are enabled to accommodate themselves to the spring of the foot in walking. The soles of pattens and clogs have heretofore been usually made of wood, or some stiff non-elastic substance, but the patentees propose to make their improved soles of stiff leather, whalebone, horn, hard rolled or ham-

mered metal, or any other suitable elastic substance, or substances combined.

The mode particularly recommended is to make the soles of these pattens and clogs of such thick leather as is usually employed for the soles of shoes, and on the under side of the leather to attach a thin plate of steel about the substance of a saw blade. Previous to uniting the leather and steel soles, the plates are to be pierced, and such holes made as may be necessary for attaching them, and for the purpose of rivetting the rings or irons thereto, and also for affixing the straps or ties, heel pieces, &c. This mode of fastening the rings or irons, render the pattens much more durable than when attached to wood. After these have been affixed to the elastic steel plate, the leather sole and the steel plate are connected together by rivets; these are usually put near each end of the sole, leaving the middle, at the narrow part of the foot unconnected, so as to give it free action. Clogs are proposed to be made in the same way with a thin steel plate under the leather sole, and the wooden blocks are to be attached thereto by rivets as before.

The patentees say, that they do not confine themselves exclusively to the employment of the materials above-mentioned, their invention "being an elastic or flexible sole applied to pattens and clogs of whatever material or materials that sole may be made; and which elastic soles as applied to pattens and clogs being to the best of their knowledge and belief, a new contrivance, &c." they claim under the above-mentioned patent.

[*Inrolled February*, 1824.]

To John Hughes, *of Barking, in the County of Essex, slop-seller, for certain Means of securing the Bodies of the Dead in Coffins.*

[Sealed 11th September, 1823.]

The anxiety of surviving relatives to prevent the disinterment of the dead has called forth many inventions that have become the subject of patent right, of which the above is one. This contrivance is an additional or false bottom adapted to the ordinary coffin, to which the corpse is proposed to be secured, by means of metal chains, bars, hoops, straps, staples, &c. embracing the body in various directions, and made fast at their extremities to the false bottom, by screw-bolts, nuts, spring catches, and other fastenings. The false bottom itself is secured in the coffin by locks, plates, springs, or secret bolts, which being difficult of removal, are considered to be sufficient preventives against the practice of body stealing. This additional bottom to the coffin may be made of wood or metal, but if of wood, it is necessary that it should be bound with iron hoops, to guard against its being cut or broken.

The patentee has shewn several methods of bracing the corpse to the coffin bottom, by means of these chains, hoops, &c. passing round the neck, arms, loins, knees and ancles, and a cage to cover it entirely; and also sundry pins, sockets, plates, staples, bolts, nuts and catches to secure them, all of which may be readily conceived; but he states that he does not mean to confine himself to these particular kinds of fastening, or to use the whole of the contrivances at once, except under particular circumstances.

[*Inrolled November*, 1823.]

To Gerard Graulhie, *of Castle Street, Holborn, in the City of London, Gentleman, for Communications made to him by certain Foreigners residing abroad, of a Machine or Apparatus upon a new and portable Construction, capable of being inclined in different degrees, adapted to the conveyance of Persons and Goods over Water or Ravines, for Military or other Objects, and applicable also to purposes of Recreation and Exercise.*

[Sealed 16th April, 1823.]

Many of our readers have witnessed a species of amusement practised in Paris, consisting of sliding carriages, passing up and down inclined planes, which are called the *Russian Mountains.* The present project is something of the same kind now first imported into this country. Without expressing any opinion as to the merits or usefulness of the invention, we cannot but regret that a foreigner, probably unacquainted with the English language, should have been so ill-advised as to inrol such an unintelligible document as the specification of his invention now before us. We have perused this rare production with considerable attention, but are totally unable to point out its features, or to comprehend in what it consists. We are therefore, compelled in this instance, to deviate from our usual practice, and to give the specification literally.

"This invention is composed of the following parts, viz. First. Frames and posts more or less elevated, and placed at a distance from each other, See drawing fig. 1. A. (Plate X.) to support the tables with thin ropes, ways, and balustrades, (hereafter mentioned) and to form with them flying bridges, and other machinery, portable and flexible, and susceptible of different undulations, and degrees of inclination; with the facility of changing at pleasure the inclination or declivity from one direction, to the opposite di-

rection, (fig. 5, 6, and 7.) and to form with the tables an ascending part, which is the shortest (fig. 1, B. and fig. 2, A.) and a descending part, which is the longest, (fig. 1, C. and fig. 2, B.) with the double floor either at the top, or bottom of the inclined planes, consisting of two tables, one sliding over the other, to fill up the space produced by slackening the main ropes or chains.

" Second. Wood, metal or any other tables, (fig. 2, D. and fig. 3, A.) made of any convenient length and width, with one edge of each table made convex, and the other edge concave; so that when the tables are drawn close they may work together like a joint attached to each other by ropes, or chains, passing above, or below, through holes made at each side of the said tables, (fig. 2, C. and fig. 3, B.) These tables are supported by main chains, or ropes, tightened at pleasure by windlasses, (fig. 1, D.) giving the facility to change the declivity, and to diminish the motion at the commencement of the circular tables.

" Third. Semi-circular tables, (fig. 2, E.) made of the same meterials as the straight tables before-mentioned, and supported by a circular frame, (fig. 1, A.) with posts high enough to receive the hand rails (hereafter mentioned,) and having (in addition to the general declivity) a particular inclination, or declivity, in the inside of the semi-circles, so as to balance the centrifugal force, by the power of gravity, by proportioning the inside particular inclination of the semi-circular tables, to the general declivity of the whole, and to the velocity required in consequence.

" Fourth. A circular projection of iron rod, or wire, or other material affixed to the inside of the posts, surrounding the circular frame, and hanging over the extremity of the axle-trees, outside of the wheels, so as to prevent the possibility of the wheels rising and running over the ways; such circular projections giving facility to form an endless circus, or elipsis, where the cars (hereafter men-

tioned) running with great ease and perfect safety, may be kept in a continued and uninterrupted motion.

"Fifth. Ways fixed to the tables on each side, to connect together the boards forming each table, and likewise to direct the wheels of the cars running on the connected tables, (fig. 2, F. and fig. 3, C.); and to prevent any side motion of the said tables, bareface tenons, or rebates, (fig. 3. D.) are formed at the end of each way, so as to join half of the ways of one table, to half of the ways of the next table, without destroying their flexibility, or their backward or forward motion; and also moveable ways at the bottom of the descent to turn the cars off the machine, when it is necessary for them to stop.

"Sixth. Balustrades at each side of the connected tables, formed of a hand-rail of ropes, running through the tops of the posts; the said hand-rails connected with the tables by means of other smaller ropes, in the form of network, (fig. 1, D.)

"Seventh. Cars with two axles moving on the bolts which attach the said axles to the pivot, allowing the wheels to accommodate themselves to the parabola of the circles, so as to prevent their friction on the circular ways. The bodies of the said cars are made to move backwards and forwards on another axletree, which gives to a hooked lever underneath, (fig. 8, A.) the facility to pull down, or bring forward the front of the cars, and place the body of the cars and the rider in a horizontal position on the ascending part, by the action of the rope or chain-ladder (hereafter mentioned) on the lever, in catching the iron steps of the ladder, and by the re-action of the hooked part of the lever, on the front part of the cars; and at the commencement of the descent, the body of the cars and the riders returning backwards by their own gravity are equally in the descending part in a horizontal position.

"Eighth. An endless rope or chain-ladder on the ascending

part, with iron-rod steps; (fig. 2, G. and fig. 4, A.) turning or revolving by means of persons turning the handles of the large wheels, (fig. 2, H. and fig. 4, B.) on two wheels, one small at the bottom, the other large at the top; the large wheel with cogs or catches, (fig. 4, C.) to prevent the ladder from slipping while drawing up the cars, which is performed by the steps of the ladder catching hold of the hooked lever, before-mentioned, (fig. 8, A.) of iron, fixed underneath the said cars; the lever moving in one direction only, so as to pass over the iron-rod steps of the ladder in going up, and catching them in the tendency of the cars to go back. The cars being thus drawn to the top of the ascending part or commencement of the descending part, are then impelled forward by their own gravity."

"Finally. It is for the flexibility of the tables; for the circular ends, ways, and tables; for the susceptibility of the cars assuming a horizontal position in ascending the machine, and for the mode of bringing up the cars, that this patent is obtained."

[*Inrolled October*, 1823.]

To RICHARD ROBERTS *of Manchester, in the County of Lancaster, Civil Engineer, for certain Machinery or Implements applicable to the process of Weaving plain or figured Cloths or Fabrics, which may be used on and in conjunction with Looms now in common use; and also certain Improvements in the construction of Looms for Weaving plain and figured Cloths or Fabrics, and in the method of working Looms, either by Hand, by Steam, or by other Power.*

(Continued from page 117.)

THE second improvement applies to that description of loom employed for the weaving of figured goods, and con-

sists in certain machinery to be placed above the loom for the purpose of effecting the raising and depressing of such parts of the warp as are usually operated upon by the draw-boy. Very considerable difficulty and labour is attendant upon the old mode of setting in any particular pattern, figure, or design to be woven, but this labour and consequent expense is, in a great measure, overcome by the plan proposed under the present patent.

A section of the improved piece of mechanism is shewn in Plate X. fig. 7, which is to be placed immediately over the heddles or leases of the loom; *a*, is a cylinder mounted upon an axle, and supported upon bearings in the frame. The periphery of this cylinder is perforated with a vast number of holes at equal distances apart, so as to render the appearance of its entire surface like a colander. Previous to placing the cylinder in the loom, it is to be covered with stout drawing-paper, and when set in such a situation that the light may shine through the perforations, a small punch is to be employed for the purpose of pricking through the paper, and through the cylinder, certain holes corresponding to the required pattern.

The cylinder thus pierced is then placed in the frame as shewn at *a*, so as to revolve upon its pivots, resting in bearings capable of accurate adjustment. A series of needles *b*, are ranged in a horizontal position, so that their end may come in contact with the periphery of the cylinder.—Cords *c c*, and *d d*, fastened to the frame above, pass through eyes in the needles, and proceed down to the heddles or leases below. These needles work in guide-pieces, and are supported by a straight bar *e*, which passes through their bent parts behind, and by that means they are enabled to slide accurately in a line with the axis of the cylinder. When the ends of the needles come against the blank or unpierced parts of the paper upon the periphery of the cylinder, they

are pressed back, and the cords are drawn out of the perpendicular, as *d, d*, by which means the needles acquire a tendency to advance when any of the apertures come opposite them, so as to permit their ends to slide forward. When any of the needles have slidden forward through any of the apertures of the cylinder, the cords attached to those needles become straight as *c, c*. There are four bars *f g, f g*, from each of which a row of forks, like a wide toothed comb extend. Between the forks, or teeth of these bars, the cords pass; and as the bars are drawn up or let down by the action of the top levers, a knot in each of the cords, causes them and the heddles to which they are attached below, to be drawn up or let down also: it will hence be seen that those needles which have been allowed to advance by passing into the apertures of the cylinder draw the bent cords *d, d*, into the straight position of *c, c*, and by that means those cords are withdrawn from the teeth of the forked bars *g, g*, and are placed between the teeth of *f, f*, which in rising, take hold of the knots, and lift the heddles attached to the cords so operated upon; while those needles which are forced back by the blanks of the cylinder, keep their cords bent in the position of *d, d*, and the heddles connected to these cords are lifted by the rising of the bars *g g*, thus the different parts of the warp required to be raised to produce any particular pattern or damask figure, are so raised by the shifting of the cords connected to the respective heddles from the fork bars *f* to *g*, or from *g* to *f*, as may be required, which is effected by the sliding of the needles as above described.

The manner in which the different parts of this piece of mechanism are put in action is as follows; *h*, is a main shaft turned by a connexion with the lay of the loom, so as to move half round every time that the shuttle has been passed across the warp. Upon this shaft there are several

cams or tappets, operating upon levers; *i*, is one of these cams which, as it revolves, strikes against the friction-roller of a bent lever *j*, and drives the rod *k* forward. At the reverse end of this rod *k*, there is a vibrating lever *l*, connected to which a pall *m*, is attached, and this taking into the ratchet-teeth of the cylinder *a*, causes the cylinder to advance one tooth every time that the cam *i*, strikes the lever *j*, and rod *k*. There is a hook *n*, by the side of the pall *m*, which is connected also to the action of the lever *l*, and rod *k*, for the purpose of giving the cylinder a retrograde motion: which is requisite when the figure or pattern is designed to be worked backwards and forwards, as in what is called a *point pattern;* the means of putting either the pall or the hook out of action, is a cam upon the shaft *o*.

In order to move the cylinder forward one tooth of a revolution, it is necessary to withdraw those needles that have passed into the apertures; this is done by the cam or tappet-wheel *p*, (also upon the main shaft) permitting the rod *q*, to recede, and with it the guide-bar *e*, which draws the whole of the needles *b*, a short distance back every time that the shuttle has passed across the loom. The lifting of the fork bars is produced by two tappets *r* and *s*, likewise upon the the main shaft, which coming in contact with the friction-rollers of the bent levers *t*, *v*, by the cords at their extremities, alternately pull down the longer arms of the top levers, and thereby cause the shorter arms of the same levers to lift the forked-bars, and the cords *c* or *d* as before described.

The third improvement applicable to looms consists in a new mode of taking up, or winding the cloth, or fabric upon the beam, or cloth-roller as it accumulates in the loom; this part of the invention is capable of adaptation to both power looms, and those worked by hand. It has been found extremely difficult in hand-looms to produce an even cloth, owing to the unequal force by which the lay has beaten up

the weft or shoot. This contrivance is shewn at (fig. 10.) which exhibits an end view of a power loom, such parts only being shewn as are necessary for the illustration of this contrivance.—*a*, is the roller upon which the yarn is wound; this roller turns with considerable friction owing to the weighted cord coiled round it, which distends the warp threads *b*. The roller upon which the cloth is wound is marked *c*, and has upon its axis a toothed-wheel *d*, taking into a pinion upon the axle of the ratchet-wheel *e*. This ratchet-wheel is moved round by a hooked pall *f*, which is connected to the lever *g*, and this lever being jointed to the leg of the lay *h*, causes the hook to pull the ratchet-wheel one tooth at every vibration of the lay.

If the weft or shoot carried by the shuttle be of uniform substance, the cloth or other fabric woven by these means will be of an even texture, but if some parts of the weft be thinner than other parts, then the lay will come forward a small distance, and permit the tail rod *i*, to strike against the short lever *k*, which will cause the hook *f*, to be lifted out of the teeth of the ratchet, and the beating up of the cloth will proceed without causing the roller *e*, to draw it off, until a second weft thread has been introduced, which by the increased thickness prevents the advance of the lay as before, and now allows the hook to take hold of the ratchet, and draw it one tooth forward. When this contrivance is adapted to a power loom, the lay must be worked by an arm which has a spring, in order to permit the lay to advance according to the thickness of the weft.

The fourth improvement applies to the working of the yarn-roller, and the cloth-roller together, by means of certain machiney as will be explained. Fig. 11. shews the end of a loom with such parts as are necessary to explain this improvement; *a*, is the yarn-roller with a toothed-wheel *b*, upon it axis; *c*, is a horizontal shaft having an endless screw

upon it, taking into the toothed-wheel; *d*, is a friction-pulley, over which two weighted cords pass, the one *e*, fastened to the frame, the other *f*, attached to an arm or lever *g*, extending from the leg of the lay. When the lay goes back previous to throwing the shuttle, the lever *g*, draws down the cord *f*, in which act the pulley *d*, and its shaft *c*, is turned a short distance round, and the endless screw upon this shaft taking into the toothed-wheel *b*, causes that wheel and the roller *a*, to turn sufficiently for to give out a portion of the warp. When the lay returns for the purpose of beating up the weft, the lever *g*, slackens the cord *f*, which now slides, and is drawn tight by the weight at its extremity, the pulley *d*, being prevented from returning by the friction of the weighted cord *e*.

In order to regulate the delivery of the warp, according to the larger or smaller diameter of the warp-roller *a*, a lever *h*, is placed at the back of the loom, carrying the friction roller *i*, which is pressed against the periphery of the warp-roller, by the tension of a cord *j*, fastened to the lever *h*, and passing thence over a pulley to the arm or lever *g*, before-mentioned. This lever is pressed by a spring *l*, in the side of the lay, and as the diameter of the warp roller diminishes, the lever *h*, advances and relaxes the cord *j*, by which the spring *l*, is enabled to force the arm *g*, farther out, and hence the cord *f*, is drawn further down in the receding of the lay above described, which draws the pulley, also, and thereby causes the toothed-wheel and the warp-roller to advance more rapidly than would be required, if the roller was full.

In opening the sheds of warp for passing the shuttle, the warp-roller is not permitted to give way, as in other looms: but the cloth-roller is made to yield by the following means; *m* is the cloth-roller, having a toothed-wheel upon its axis, taking into a pinion which is fixed upon the axis of

the pulley *n*; this pulley has two grooves of different diameters, round which pass cords with balance weights. As the lay vibrates, its tail lever *o*, draws the cord up and down, which by friction causes the pulley to move sufficiently to afford the required relaxation of the cloth.

The fifth improvement consists in disposing the warps and shuttles in several ranges, one above the other, which particularly applies to ribbon looms; in this improvement the shuttles are placed in the lay in several rows, and consequently several portions of reeds are adapted to correspond to the several rows of warp. The sixth improvement is in the manner of working these shuttles for the weaving of narrow goods as ribbons; by which arrangement, shuttles with different colours, or shades of colour may be worked at the same time. The lay is provided with an iron sliding frame, having beaters extending up and down, so as to reach the several shuttles in the upper and lower rows: or if more than two rows of shuttles be arranged, then the sliding beater is formed as a ladder.

The improvements claimed under the six heads above described, appear to bear a strong resemblance to inventions which are already before the public, we therefore refer our readers as regards the first and third heads to *Bowman's Patent*, Vol. II. page 161 of this Journal; as regards the second head to *Lambert's Patent*, in the same Vol. page 95, and as regards the fifth and sixth heads to *Goodman's Patent*, Vol. VI. page 174.

[*Inrolled May*, 1823.]

To James Smith, *of Droitwich, in the County of Worcester, Civil Engineer, for his Invention of an Apparatus for applying Steam to the boiling and concentration of Solutions in general; Crystallizing the Muriate of Soda from Brines containing that Salt; Melting and Refining of Tallow and Oil; Boiling of Sugar; Distilling and other similar Purposes.*

[Sealed 19th June, 1823.]

This invention is said to consist in "a new manner of constructing a steam-boiler with a flat and extended top, or upper surface, and in performing the various operations," (expressed in the above title) "on the top or upper surface of such boiler." Plate XI. fig. 3, represents a cross section of the apparatus; *a a* is the boiler, having a flat top. In order to give the required strength to a boiler of this shape, its top and bottom are tied together by bolts, as shewn; the fire is applied beneath in any of the usual modes.—*b b* is the pan or vessel in which the evaporation and crystallization is to be performed; its sides are made to extend beyond the boiler, for the purpose of keeping the edges of the pan cooler than the middle parts. The fluid is thus prevented from boiling over, and the salt as it forms, is thrown by the ebullition, upon this projecting part, by which less incrustation attaches to that part of the bottom where the steam is in more immediate action.

In setting this apparatus to work, water must be introduced into the boiler, by means of the funnel and pipe *c*, to the depth of about two inches, which may be ascertained by means of the gauge-cock *d*, and when the water is required to be drawn off, that may be done by the cock *e*, the cock *f*, above, being for the vent of rarified air, when necessary: *g* is a safety-valve loaded with a weight, opening

upwards by which the steam is to escape, if its pressure should exceed the point of safety.

By this arrangement it will be seen that the fire employed beneath the boiler will cause steam to be generated, and distributed under the bottom of the pan, so as to heat the fluid contained therein; and the upper surface of this fluid being exposed to the atmosphere, it will always be sufficiently cool to cause a continual condensation of that steam which comes in contact with its bottom, so that a steam vent in the boiler is unnecessary, and hence the water therein seldom requires to be replenished.

The boiler is to be formed of plate iron, rivetted together at the edge as usual, and bound as above described; the dimensions proposed as eligible for evaporating brine, are twelve feet wide, and fifty feet long, the depth being about nine inches. The pan is to be twelve inches deep, of the same length as the boiler, but to project eighteen inches on the sides, for the reasons above stated. The sides of the boiler and pan are to be about a quarter of an inch thick, and the bottom and top of the boiler about three sixteenths, and the bolts should be about six inches apart throughout the whole boiler.

"Now these pans hereinbefore described as used for the evaporation of brines, may require some slight alteration in form or additional strength when used for the boiling of sugar, or for the melting and refining of whale oil or tallow, or for distilling or other purposes to which they may be found applicable."

[*Inrolled December*, 1823.]

To Sir Isaac Coffin, *of Pall Mall, in the County of Middlesex, Bart. Admiral of the White Squadron, in consequence of a Communication made to him by a certain Foreigner residing abroad, for a certain Method, or Methods, of catching, or taking Mackarel and other Fish.*

[Sealed 15th July, 1823.]

The method of catching mackarel here proposed, is by allowing the fishing-vessel to drive under fore-sails, when a quantity of bait, previously prepared, is to be thrown over board in small portions, by one or two boys as the vessel proceeds; which is designed to bring a shoal of fish round the vessel and to cause them to follow it. Each man of the crew now takes two lines, with hooks affixed, but without bait, which are to be thrown in alternately, and while one of the lines is sinking, the other is to be pulled in.

The form of the hook (called a jagger) is shewn in Plate IX. fig. 13, and above it is the lead into which the hook is inserted. To the lead is attached the line, about seven fathoms long, which line is to be fine, and died of a dark blue colour. The lead, about four inches long, is occasionally to be scraped bright, in order to resemble the bait, and will be readily seized by the fish, under the above circumstances. When drawn up, the fish caught is thrown off the hook on to the deck by a jerk, without being touched by the hand, and by these means mackarel may be caught very expeditiously and in great quantities.

The bait to be thrown in is proposed to be chopped pieces of cod or other fresh fish, cut up in a machine or mill, consisting of a box with a revolving cylinder filled with cutting knives, passing round between a series of fixed knives, the construction of which is easily understood, and

the fish to be cut is placed upon an inclined board descending to the cutter. Salt fish may be employed for bait if fresh cannot be conveniently obtained, but it is not considered to be so desirable.

[*Inrolled January*, 1824.]

To MONCRIEFFE WILLOUGHBY, *of Fair Street, Horsleydown, in the County of Surry, Gentleman, for certain Improvements in the construction of Vessels, so as to enable them to sail with greater velocity.*

[Sealed 26th June, 1823.]

THE object of this invention is to adapt deep iron keels to ships and other vessels by way of ballast, to render these keels moveable, for the purpose of enabling the vessel to navigate in shallow water. The use of the keel is to form a lateral resistance in the water, to balance the vessel, and prevent its falling over; consequently the deeper the keel, the greater will be the lateral resistance, and vessels with deep keels are enabled to carry a greater surface of canvas without the danger of being upset. There is however an inconvenience in deep keels, for the vessels are thereby prevented from riding in shallow water. To retain the advantages of a deep keel, and yet obviate this inconvenience, moveable false keels have been adopted, which have been made to slide over the fixed keel.

The present invention consists in applying to the under side of the vessel, the whole or any part of the weight intended as ballast, by means of an iron keel, which is contrived to move up and down by suspending rods passing through water-tight grooves, which are made perpendicularly through the middle of the hull of a flat-bottomed vessel. There are many ways of adapting this contrivance, but one of the most sim-

ple is that shewn in (Plate XI. at fig. 4.); *a a*, is the hull; *b b*, a cast or wrought iron keel suspended by the piece *c*. This keel may be suspended by several pieces extending from the bottom of the vessel, and the shapes of these suspenders may be varied; this must be of strong materials, wrought iron is to be preferred, and should be thin, and knife-edged in front in order to cut the water. They are proposed to be made broad, as shown in the figure, so as to answer the purpose of lee-boards.

The improved ballast keel *b*, *b*, is made to fit the bottom of the vessel from stem to stern, so that in case of meeting with sand-banks or shallows, the vessel might be enabled to slide over them, or rest until the keel could be drawn up by means of the rack and pinion, as shewn in fig. 5, at *d*, in the section. These ballast keels may, if necessary, be strengthened by several lateral braces *e*, *e*, or four iron guys, running diagonally from the keel on both sides, and made fast to the chains. These guys must be constructed with joints so as to fit the sides of the vessel, as well as for the purpose of enabling them to yield when the keel is drawn up; and lee boards might be placed upon these guys, similar to those used by the Dutch.

Vessels which are to be built upon this plan are recommended to have these ballast keels after the mode shewn in the figure, but those which are already constructed with sharp bottoms, must be formed to suit their present keel, and may be suspended by rods in place of the pieces *c*.

The patentee says, " I conceive that the adoption of my invention will produce the following among other important advantages, (viz.) when the ballast keels are lowered down into the water, by acting upon the principle of a lever, a less quantity of ballast,—a third part, or perhaps a quarter of the usual quantity may be sufficient to keep a vessel in an erect position, and her hull being sunk to a less depth in the water,

there will of course be less resistance to her motion through it. When her keel is thus lowered upon the principle of the lever, a vessel may be enabled to carry two or three times the usual quantity of canvas; and as she will also have as before said less resistance to overcome, so her velocity may be accelerated in a two-fold degree.

"When the ballast keel is drawn up close to the hull, and the vessel is constructed with a flat bottom, the vessel will draw but little water, and will be enabled to pass over most of the shoals and bars at the mouths of rivers, and also to ascend them at their lowest ebb, provided they afford water enough for the least navigation.

"A vessel carrying no ballast in her hull, will be enabled to stow a greater cargo, and this combined with the possibility of making quicker voyages, will, in many cases, be a benefit of the first importance, and particularly in the conveyance of perishable articles, as fruit, &c. In the case of steam packets, it is obvious that the adoption of the system must be highly advantageous, as it would at once enable them to sail with safety and rapidity, upon the boisterous ocean; where it is universally allowed they are at present so very crank. To Packet service, to the Revenue Cutters, and to small ships of war, the benefit to be derived from its adoption must be immeasurable, and invaluable."

[*Inrolled December*, 1823.]

To THOMAS TIMOTHY BENINGFIELD, *of High Street, Whitechapel, in the County of Middlesex, Tobacco Manufacturer, and* JOSHUA TAYLOR BEAL, *of Christian Street, St. George's in the East, Cabinet Maker, for certain Improvements in Steam-Engines.*

[Sealed 27th September, 1822.]

THE improvements herein proposed, apply to that description of Steam-Engine, called *Rotatory.*—Plate XI.

fig. 1, is a cross section of the improved engine; and fig. 2, is a longitudinal section of the same, the letters referring to the like parts in both; *a a*, is the central shaft, resting on bearings, which carries the rotatory parts, but is intended itself to remain stationary; *b* is a cylindrical piece or disc, in the middle of the engine, connected with the shaft; *c c*, and *d d*, are cylindrical end-pieces made fast to the shaft and disc; and these constitute the fixed parts of the engine; *e*, *e*, *e*, is an outer moveable cylinder, to which end-plates *f f*, are bolted, the joints being all secured with packing as usual.

A circular steam-passage *g*, *g*, *g*, is thus produced, in which the piston *h*, screwed to the fixed cylinder, and extending the width of the channel, forms a stop; *i*, *k*, are two valves or leaves, also extending the whole width of the steam-passage. These leaves turn upon hinge joints, and fall into recesses in the outer or moveable cylinder, as at *i*, in order to pass the piston, or stand out against the periphery of the fixed cylinder, as at *k*. A pipe *l*, is connected to the central shaft, which is hollow, and through it and the disc *c*, the steam passes from a boiler, as shewn by the arrow, to the induction aperture of the engine at *m*; there blowing into the circular channel *g*, it is stopped by the leaf *k*, and by the piston *h*, and here exerting its elastic force against these two resisting surfaces, the outer cylinder is impelled round until the leaf *k*, has passed the eduction aperture at *n*, when the steam that occupied the channel becomes instantly condensed and drawn off through the pipe *o*, to the condenser, by the exhaustion therein formed.

In order to open or close the leaves *i* and *k*, at proper times, an elongated part of their axles extend through the end-plates with tappets *p*, and *g*, and as the outer cylinder revolves, these tappets strike against fixed wipers *r* and *s*, and

cause the leaves *i* and *k*, to turn up or down. During the progress of the cylinder as above described, the leaf *i*, has been brought out of the recess by the wiper into the position of the dotted lines fig. 1, and now the steam which blows in at *m*, exerts its elastic force between the leaf *i*, and the piston *h*, the leaf *k* having fallen back into its recess. Thus by a succession of these operations, a continuous revolution of the outer cylinder is maintained; and by attaching a rim of teeth to this outer cylinder, a rotatory motion may be communicated as a moving power to actuate other machinery.

Two or more pistons upon the principle above described may be employed, in which case several of the leaves or valves *i*, *k*, must be introduced; and it is also in the contemplation of the patentees to *fix* the outer cylinder and cause the shaft with the inner cylinder and piston to revolve; this may be affected without in any degree deviating from the principle upon which the engine is constructed.

[*Inrolled, March,* 1823.]

There have been patents obtained for several rotatory steam-engines upon principles very like the present; see *Malam's Patent,* Vol. I. of this Journal, page 92; *Carter's Patent,* Vol. II. page 340; *Delap's Patent,* Vol. III. page 127; *Moore's Patent,* same Vol. page 169; and *Masterman's Patent,* same Vol. page 173. The great defect of all these, is the friction produced by their action. There are also several other rotatory steam-engines, somewhat varied in principle from this, as *Ryder's Patent,* Vol. II. page 18; *Bainbridge's Patent.* Vol. VI. page 69; but we believe none of these rotatory engines have been applied to actual work.—Ed.

Original Communications.

To the Editor of the London Journal of Arts, &c.

On the Phenomenon of Heat, by JOSEPH LUCKCOCK, Esq., *Edgbaston, near Birmingham.*

PERHAPS there is no term in the economy of nature, so vague, so ill-defined, so little understood, or so misrepresented as the term heat; its substance and its source are alike involved in obscurity. Mr. Brande says, 'nothing is known of the nature or cause of heat.'

The vivifying warmth we experience from an unclouded sun, has led to the error of its being an immense mass of liquid fire, and given birth to the rude unphilosophical idea, of particles of its own substance, emanating with prodigious velocity in all directions through the great void of the solar system; even penetrating to other suns, to other systems, some of which they have not yet had time to reach.

If the sun is a ponderable substance, any emanation of that substance must decrease it in bulk, and therefore, in proportion to their surfaces there must be a corresponding increase in the bulk of the planets, which in the lapse of time, must become suns, but we are aware of no such effect; thus the very source of light, of life, and of joy, must become exhausted, and destruction, death and darkness, proclaim the never-ending reign of night.

Much ingenuity and patient research have been displayed on the subject of *specific heat*, with a view to ascertain the *degrees* or quantity of heat combined with

ponderable matter; the thermometer, the meltings of ice, and the times of cooling heated substances, have been the bases of the calculations, and the imposing algebraic formulæ have been brought in aid, to give to them the air of demonstrations; the results, however, are unsatisfactory, for in the attempts to fix the natural zero, or point of absolute *privation* of heat, some have placed it at 900° below the scale of Fahrenheit, whilst others have depressed it to 11000°, and by the very same algebraic process, acting upon different substances; this shews the folly of applying the mathematics to subjects with which it has no analogy; and also shews the want of a definition of heat.

Let us not measure the powers of nature by those infantile conceptions, creating *something*, that shall be called *nothing*, which shall fill all space; and converting this *nothing* into a substantive, by giving it for a name the imposing Latin word, *vacuum*.

The universe is of necessity filled with two species of matter, the one solid and ponderable, the other is the principle of fluidity, which is imponderable; the imponderable matter is the electric fluid, the matter of heat, the element of fluidity, and to which I give the name *fluidium*, because of the meagreness of the terms applied to the subject, such as caloric, heat of capacity, specific heat, heat of transmission, thermometric heat, &c. creating a confusion of ideas in the mind, of hot heat and cold heat; the term *fluidium*, may well express latent heat, or heat of capacity, or specific heat; and the simple term *heat*, will well express its transmission by the means of chemical or electrical agency, and in which sense I shall use the terms, considering *fluidium* as the substance, and *heat* as a quality.

The quantity of *fluidium* in equal bulks of elastic fluids,

is inversely as their specific gravities, but the means before noticed for ascertaining the bulk of *fluidium* in certain bodies, appear only to shew the intensity of the degrees of *heat* as a quality, the result of the actions of bodies operated upon, whether it is the expulsion, or attraction of *fluidium*, in its passage to or from those bodies, or whether they are placed in the relative situation of an electrical machine, and become the mere carriers or conductors of *fluidium*, and appear to have nothing whatever to do with its *bulk*, or quantity; to ask the question, how many degrees of heat are there in a cubic foot of hydrogen gas? would be much the same thing with asking if the specific gravity of water is 1000 ounces to the solid foot, what would be the specific gravity of two cubic feet? the premises are false, and can lead to no results; *fluidium* cannot be measured by *degrees*, or weighed in a balance, its dimensions are length, breadth, and thickness, its boundaries, are the universe, it can only be estimated in bulk.

Sir H. Davy, speaking of the production of light and heat, very happily expresses himself, " that it is the general result of the actions of any substances possessed of strong chemical attractions, or different electrical relations;" *fluidium* is combined with every species of ponderable matter, and the quantity is in the inverse ratio of their specific gravities; and when by any powerful exciting cause, any part of it is liberated, it then becomes heat, and light, or fire, and the intensity depends upon the intensity of the exciting cause, operating upon substances in opposite states of electricity; the sun without the power of imparting heat, is the great exciting cause of *heat* in other bodies, and the effect produced, is as the specific gravity of the substances acted upon; in gaseous substances, the quantity of ponderable matter is

so extremely minute when compared with the large quantity of *fluidium* with which they are combined, the excitability so extremely small, that but little heat is produced; consequently it is found, as we ascend, the cold increases, till we are carried by the power of imagination, into those elevated regions, where there is no ponderable substance whatever, no cloud even to obstruct the sun, a total absence of matter, save the pure element *fluidium;* here we should find a total absence of heat, and no light but beneath our feet.

When the sun's rays are collected by means of a mirror or a lens, the hand or a piece of muslin may be passed through the cone of rays, without experiencing any heat, even no heat will be produced in the focus, if received in the atmosphere; which if it consisted of particles emanating from the sun's body, ought to consist of a luminous spot of great brilliancy: the heat is not in the rays, but in the substances impinged upon, whose electrical relations are changed by the concentration of the light of the sun, which has the power to separate the fluidium from the oxygen and nitrogen, in which they are dissolved, or from any other matter with which it is combined. Mr. Scoresby when in the arctic regions, formed a lens from a lump of ice, it was hewn with an axe, scraped into shape with a knife, and polished with the hand; with this lens he set fire to some wood, lead was melted, gunpowder was fired, and the sailors pleased themselves with lighting their tobacco pipes; if the heat came from the body of the sun, if it was in the sun's rays, why was it not arrested by the *ice?*

There is no term in mechanics, perhaps, of such frequent recurrence as the word vacuum; a good air pump is said to produce a vacuum; but Dr. Halley, saw a meteor moving with prodigious velocity in a medium, which he conceived to be a thousand times rarer than the contents of the receiv-

er of the air pump. In a steam-engine, the steam in the cylinder meeting with a jet of cold water, is said to produce a vacuum: *steam* is a well known compound, consisting of water and fluidium at a certain temperature: when the temperature is reduced by means of the jet of cold water, the steam is resolved into its elementary principles, namely, *water* and *fluidium*; but how long has *fluidium*, the matter of heat, been designated as *nothing*, which the term vacuum implies? the stroke of the engine is produced by the imponderable substance fluidium, on one side of the piston, and the force of the expanding steam on the other. What has hitherto been called a perfect vacuum *is a space completely filled with fluidium, perfectly divested of all ponderable matter.*

Description of working a steam-engine, on the principles of the mechanical philosophy:—

All matter is composed of mathematical points; solid, hard and impenetrable; indissolvable, incorruptible and immutable; they cannot be exhibited to the senses, they can only be imagined, but neither seen or felt.

Tangible matter as opposed to mathematical points, consists of these points insinuated into, and occupying the centre of so many caloric balls, not unlike the apple in a dumpling, and to these points so covered, are given the power of repulsion; viz. they are in a wonderful bustle, and in perpetual motion, each begging of his neighbour to keep his distance; these little dumplings in rapid motion like the heavenly bodies, are whirling about in *nothing at all;* but as this would sound rather oddly in the living languages, the name *vacuum*, has been given it; and if these points are in a certain form to constitute oxygen, what I have so learnedly described is the *oxygen gas* of the mechanical philosopher; and if the invisible point should be of the hydrogen form, then I have no less learnedly described *hydrogen gas*. Now if 1986 measures of these gases

in proper proportions, are confined in a vessel, and the electric spark passed through it, the little quarrelsome moleculæ all of a sudden become very sociable, each of the little oxygens seizes his little hydrogen, and they drive away the greater part of the caloric, send away as useless nearly all the vacuum, break up the remaining balls of caloric, into balls of smaller dimensions, huddle themselves together in pairs, each pair getting into their new caloric balls, into their little nests, the 1986 measures being reduced to *one*; and in this state of voluntary compression they call themselves *water*, all this complicated process being performed in the twinkling of an eye; and with this water we are to work our *steam-engine*. When fire is applied to the boiler, heat is produced in great abundance, but how the heat acts, we are left in a state of ignorance, by our great infallible prototype: some of us think that it merely restores the quarrelsome disposition of the little atoms, in their voluntary imprisonment, till they reach their original repulsive distance—viz. 1986 times farther asunder, thereby increasing the vacuum; while others of us think that the heat gets through the substance of the boiler in the form of shot, dispersing the little pairs of oxygen and hydrogen; when the steam is admitted into the cylinder, and the cold water introduced, they are all scared out of their wits, huddle themselves together into the 1986th part of the room they previously occupied, leaving our grand agent a vacuum behind them.

When nitrate of potass is thrown into cold water, a certain portion of it is dissolved, but how is it dissolved? certainly not by the solid oxygen or solid hydrogen contained in the water, one *solid* cannot dissolve another *solid*; it is dissolved by the fluidium contained in the water, and to which it owes its fluidity, the water or rather the fluidium will become saturated and dissolve no more; but throw into

the solution a quantity of heat, which heat does not become permanent but slowly passes through it, and its dissolving powers will be renewed, it will then take up an additional quantity of the nitrate; but the added quantity of fluidium merely passing through the solution as a conductor, will exert a superior affinity, it will gradually combine with the atmosphere, let go the additional quantity of nitrate it had dissolved, which will be deposited in the form of chrystals, —the fluidium has been the only active agent.

If one part of potassium be melted with three parts of sodium, viz. dissolved in heat, the compound or alloy will retain so much of fluidium as to constitute a fluid metal, at common temperatures resembling mercury. If the specific gravity of this alloy was known, it would be easy to calculate the increase of the quantity of fluidium contained in the compound. The quantity of fluidium contained in fluids, is more easily ascertained; 100 measures of water at 50°, will at 212° measures 104,5; and when converted into steam, will be increased to 198,600 measures; here the additions of specific heat or fluidium are easily understood; but we are not acquainted with the quantity contained in cold water, consequently these terms are not positive, they are only relative.*

It has been considered by Mr. Dalton as a matter of surprise, that "the different gases have not different affinities for water, and that the quantities of water dissolved in like circumstances, should have varied according to the nature of the gas. Saussure found, however, that there was no difference in this respect in the solvent powers of carbonic acid, hydrogen gas, and common air. It might be expected that at least the *density* of the gas would

* See Paper on the Specific Gravity of Oxygen, p. 137.

have some influence upon its solvent powers, *that air of half density would take half water*, or the quantity of water would diminish in some proportion to the density; but here again we are disappointed; whatever be the rarefaction, if water be present, the vapour produces the same elasticity, and the hygrometer finally settles at extreme moisture, as in air of common density in like circumstances." The confusion of ideas in this passage is truly astonishing, the reasoning applies exclusively to *solid* carbonic acid, *solid* oxygen, *solid* nitrogen, and *solid* hydrogen; the fluidium, which forms *only* 999,778 parts out of the million, has been entirely overlooked, and which was the sole agent actively employed. Mr. Dalton goes on to say, "that the wonder does not cease here; a *torricellian vacuum* dissolves water, and in this instance we have vapour existing independently of *air* at all temperatures; what makes it still more remarkable is, the vapour in such vacuum, is precisely the same in quantity and force, as in the like volume of any kind of air of extreme moisture." Pictet also, in an essay on fire, says, "that all the train of hygrometrical phenomena takes place just as well, indeed rather quicker, in a vacuum, than in air." These gentlemen are still labouring under the same mental delusion, wondering how water can be dissolved in *nothing;* they are not aware that their own showing proves the existence of *fluidium*, an exhausted receiver, or a torrecellian tube, does not contain a vacuum, but they do contain a substance of all others, the most free to act upon moisture.

Fluidium, the matter of heat, is united with all ponderable matter; it is the grand universal medium in which the heavenly bodies exist, and perform their never ending revolutions; it fills all space; its boundaries are the universe; it is the only elementary fluid; and, as Boerhaave

says, it is the sole cause of fluidity in other bodies. Fluidium is the *principle of life* in all animated existence, both animal and vegetable;—when the animal functions cease to extract it from the earth or the atmosphere, to supply a perpetual evaporation, we die, the fabric is dissolved into its first elements, and dispersed in air, there being no solid left, the phosphate of lime only excepted.

Fluidium is exhibited to the senses, by those gambols of nature, the volcano and the thunder storm; by the electrical machine drawing it forth from the earth; by the voltaic battery; by the sun's rays extracting it from every substance on which they impinge; by changing their electrical relations, in a wonderful variety of chemical agency; by friction, if we close the eyelids and rub them with some force, both light and heat are produced; by pressure as is evinced by the condensation of the gases; by the air-gun, and by that beautiful experiment of igniting the tinder of the agaric by a single stroke of the condenser; and by all those means by which, fire, and light, and heat are developed.

The matter of heat has been said to be the great repulsive power; so far from it, it is the operating, the active cause of all chemical attraction, all chemical combination; it is infinitely more abundant than all the other kinds of matter, with which it unites, and of which it is the life and soul, for without the aid of fluidium, all ponderable matter would be inert and dead.

OIL AND COAL GAS COMPANIES.

To the Editor of the London Journal of Arts, &c.

Sir,

As there appears a sort of gas mania at present, a few observations on the subject will perhaps not be unaccept-

able to your readers. For several weeks past there have been several gas companies projected, most kindly and disinterestedly undertaking to lighten our darkness, but in reality, only intending to enrich themselves by the plausibility of their plans on the credulity of their subscribers. Let us coolly examine their pretensions. It seems gas has turned out a tolerable good speculation upon the whole, for, after years of up hill work, and at immense expence, the gas companies have pretty well established themselves in popular favor, and so as to yield themselves a profit of 8 per cent.; this has excited the envy of some, who, thinking to obtain profit by similar means, (though without the labour of mind, or the expence of experiments,) are for establishing new companies, in all directions, for the purpose of pocketing the premiums, and then abandoning their ill-digested plans to their fate. Now, Sir, when so much property is at stake, and the comfort, safety, and interest of the public are in question, it is every person's bounden duty to give what information he can, that deserving individuals should not be injured, or the public defrauded. It seems there is no less than three new gas companies proposed for the Surry side of the Thames, namely, one called the Phœnix, with a very large capital, to light all Southwark, &c. although it is well and fully lighted at present from the South London Gas Works, Bankside; another to light Peckham and Camberwell, where the South London Company are ready, willing, and able to extend their mains, and indeed were about doing it; another, Lord Holland's, to light Clapham, and part of Kennington, besides the Imperial Company, who have a large unappropriated capital that they want to employ, and mean to erect works somewhere about Southwark or Surry for the very same thing, and intend running their mains in all directions on that side of the water wherever

they can get leave of the Commissioners of the Roads, or customers to take their gas. These are all Coal Gas Companies, and surely these are too many. Then comes on the North side of the Thames, a new Oil Gas Company, with subscribers of shares to a capital of £500,000! to supply all London and Westminster, though we have four companies already, with seven stations fully competent to do the work, and even much more.

Now, Sir, amongst these conflicting interests, let us consider how the public interest will be affected; in the first place, if gas works are a nuisance in a neighbourhood, this nuisance will be increased; if they are dangerous the danger will be multiplied; if the taking up of the roads for the purpose of laying mains and services, repairing or altering their ramifications is inconvenient, these inconveniences will become intolerable and insupportable; the streets are now all quiet, and are likely to be so for years, the Water Companies having changed their wood pipes for iron ones, and the gas pipes all down, there will very seldom indeed occur an occasion to disturb the pavements. Then why are the public streets to be torn up and rendered impassible, and the public inconvenienced for months, nay for years, to please the fancy, gratify the vanity, or satisfy the avarice of a few speculators; where, I ask, is the advantage to the public? Why, say they, it will make monopoly cease by creating competition: Sir, I contend there is no monopoly, for there is a very great competition between gas and oil at this present moment; the latter will always prevent the former being sold too high, the public having it always in their power to check an exorbitant charge for gas by using oil; and, as it appears the Gas Companies are not able to divide more than 8 per cent. in London, and in most places in the country not so much, surely it cannot be considered an unreasonable re-

turn for their risk and capital; besides the inconvenience and danger by having several Companies' Gas pipes coming in contact with water pipes, and with each other; this is what Sir W. Congreve very properly objects to, and recommended a line of demarcation for each company, which has been agreed upon and adopted by those already established; in short, it seems to me to be only a sort of South Sea bubble that will soon burst, and the projectors will laugh at their dupes, as has been the case with Water, Insurance, and fifty other companies that were established a few years ago. The principal causes of all this is, persons have seen gas shares bear a large premium, and therefore presume several more companies' shares would do the same,—a superabundance of money in the market, and the funds yielding so small an interest: but let not the public be deceived,—these plausible schemes will most likely ruin many, and not benefit the public; they are merely set a going till they bear a large premium, and then these individuals will sell their new shares for the sake of the bonus, and leave them to their fate. The simple question for the public to consider is, will they supply them better and cheaper? I do not hesitate to answer they will not, they cannot.

Having my pen in my hand, I would observe that there seems an undue predilection for oil gas, in consequence of the assertions and erroneous calculations of Moses Ricardo and others; but all practical and disinterested men know, that oil gas can never compete with coal gas in price: it has been proved, and can be most satisfactorily proved any day, that gas from coal can be procured at one-fourth the price that it can be obtained from oil, and no oil gas works have yet been able to realize any thing like a reasonable profit, and most of them none at all; besides, the delicacy of oil gas is such, that a strong wind will blow all the

lights out when in the open air, as is often the case in the Mile-End-Road; and, as to its superior purity, it is too ridiculous to deserve an answer; therefore to puff off oil-gas seems to be chiefly for the benefit of the persons employed in making the machinery, or the proprietors of the patent right. But be it known to the public that this patent is invalid, in consequence of the impossibility of producing gas by it for any length of time. The retort is made of iron, on which the oil is made to drop when red hot, but which soon loses the power of carbonizing, this is the retort of the patentee, and all that his patent right extends to, as far as gas making is concerned; but Mr. Deville placed some baked clay (a brick, for instance) on some coke in the retort for the oil to drop upon, and the carbonizing went on as long as the operator pleased. From this it appears, that legally speaking, the patent right is public property, or in other words, any person or company may make use of the apparatus with this addition on their own account, and for their own benefit, as the patentee never thought of dropping on red hot coke or clay.* From all this it will appear that more gas companies are not wanted, all that is required is, that the present ones should serve the public well, by making their gas pure, supplying it in sufficient quantities, and charging moderate prices; when they fail to do this, I shallbe the first to propose and support the new ones.

Your obedient servant,

S. R.

March 16, 1824.

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* This assertion we do not fully admit; the patentees may maintain their right up to a certain point, and the introduction of any thing else as an improvement on the process, will not vitiate the original patent right.—Editor.

OIL AND COAL GAS.

For reasons which shall appear hereafter, I shall begin my promised history of oil gas works with that established at Bow. The works at Bow are for the purpose of lighting Bow, Bromley, Old Ford, Stratford, White-Chapel-Road, and Mile-End-Roads with *oil* gas.

On the 1st of May, 1821, this company obtained their act of Parliament, and began to make gas towards the latter end of that year, under the management of a committee of proprietors, assisted by Mr. Taylor, one of the patentees of oil gas, who happens to reside in the immediate vicinity of the works. In fact, Bow Oil Gas works has been rather considered by the Patentees as a favourable example of what oil gas could do.

At the half-yearly meeting of Proprietors, held on the 6th of February, 1823, Mr. Taylor exultingly presented to them, an abstract of the balancesheet, showing a *profit* of £240. 9*s.* 2*d.* at Christmas preceding. On this flattering statement, adividend of 2½ per. cent. was declared and PAID.

It will be presently shown, however, that this dividend was not paid out of the *profits* of the concern; but that it was actually paid out of their *capital!*

On the books coming into the new manager's hands, which did not take place till the month of April following—nearly a month after the dividend was *paid;* and on their being carefully examined, which ought to have been done before the dividend was declared, it was found that several of the entries did not tally with the sums actually demandable from the company's debtors. There was also a *residuum* of oil, to the extent of several tons, which had been entered (in Stock Account) as *useable oil,* but which was afterwards obiged to be thrown out, (or rather) burned *as useless and offensive., &c. &c. &c.*

The discovery of these matters appeared to have been a

most disagreeable affair. It led, I understand, to much unpleasant discussion, and produced much of what is termed *bad blood*. Had this been justly *pointed at the proper quarter* it would have been very well: but people in general are seldom at the pains to trace even the ordinary events of the day to their real and legitimate source. There are besides a great many truths which are exceedingly disagreeable. Be this as it may, the company's books were at last put into the hands of a regular accountant, an entire stranger to all the parties. He found them to have been conducted on such a system as to induce him to recommend a new set of books to be purchased, and the accounts made out from the very commencement of the concern. This was agreed to, and he proceeded to make up a fair state of the company's accounts accordingly

When he had struck a balance to Christmas 1822, which had, as I have already stated, shown what the *Patentee* then termed "*a clear and honest profit*" of £240. 9*s.* 2*d.* the accountant, now employed, showed, on the contrary, to be *a clear and honest loss* to the amount of £213 !!!

Last Christmas the balance was still unfavourable, but to what extent I have not been able to ascertain exactly, about 4 or £500, including of course the £213, of deficiency of the preceding year, the price of the useless oil before-mentioned, amounting to 60 or £70, and one or two other items.

Let this short and plain statement be compared with an article which I have just accidentally seen, and which was published in the *Annals of Phil.* for March 1823, signed by *Moses Ricardo*. This I am told was carefully and widely circulated amongst the Members of the House of Commons, during the pendance of the Bristol *oil gas bill* last year.

Yours,

A. H.

Novel Inventions.

New Mode of drying Grain.

Among the various subjects connected with rural economy, perhaps none is of greater importance to mankind than the preservation of grain; and in a country like this, where the season of harvest is frequently interrupted and protracted by wet and cold weather, the difficulty of housing the corn in a perfectly dry state is greatly increased, and sometimes not to be accomplished. In damp seasons the moist condition of the grain is such, that when heaped together, fermentation and germination soon takes place, the farina is decomposed, and the nutritive properties are in a great measure destroyed.

To meet this evil, kiln drying is commonly resorted to, but that is a very tedious and troublesome process, and after all is frequently found to be ineffectual, as in drying the under strata of grain, the upper necessarily in some degree absorbs the moisture emitted from below, and the whole becomes sometimes impregnated with the effluvia emitted from the ignited fuel. To avoid these and many more inconveniences attendant upon the employment of a kiln, and also to expedite the process of drying grain, Mr. James Jones of High-Holborn has constructed a very simple apparatus. It consists of two concentric cylinders closed at top and bottom, by two concentric cones, leaving a passage between the two all round of about an inch and a quarter wide. A vertical section of this apparatus is shown in Plate XI. fig. 6, and an external view at fig. 7. The outer cylinder is about six feet diameter, and to the apex of its cones, about twelve feet high. The body is strengthened by iron hoops, and is supported upon iron legs; its surface is perforated through with small holes, 2,300 in a square foot, or it might be made of wire gauze. In the front of the apparatus the

door opens to the fire-place within, through which are passages for the heated air to pass into the cylinder ; these and the circuitous flues proceeding from the fire to the chimney are best seen in the horizontal section, (fig. 8.) and in the vertical section of the fire-place detached (fig 9.) The chimney passes up nearly in the middle of the apparatus, and by this contrivance, the air in the interior of the cylindrical body becomes greatly heated, and communicates that heat to the metal plates which form the cylinders and cones. The grain to be dried, is now admitted into the apparatus by means of a hopper at top, whence it proceeds through a pipe, and a small aperture *a*, in the apex, on to the surface of the upper internal cone ; there distributing itself all round, its slides down the passages *b*, *b*, *b*, *b*, between the two cylinders to the point *c*, of the lower cone, where it is discharged through a spout into a sack, or receiver.

In passing through this apparatus, the grain becomes heated, and in its descent the moisture evaporates, and passes off through the perforations of the cylindrical body ; as the strata of grain is very thin, the heated air passes very rapidly, and the moisture is readily taken up by it.

Polytechnic and Scientific Intelligence.

Royal Society.

January 29th.—Mr. Scoresby concluded reading his paper, "On the Developement of the Magnetical Properties of Iron and Steel, by Percussion." Part 2.—A paper on this subject, was published in the Philosophical Transactions of 1822, in which are detailed the effects of certain modes of treatment of Iron of various qualities ; about two centuries since Dr. Gilbert, observed, on hammering a piece of iron

in the direction of the magnetic meridian, that it exhibited a sufficient degree of magnetism when placed on a cork, and floated in water so as to adjust itself north and south. The Doctor, however, did not pursue the subject from the fact, that steel is rendered magnetic by the contact of substances possessing that property. Mr. S. was induced to believe "that the magnetizing effects of percussion might be greatly increased by hammering a steel bar with its lower end resting on the upper end of a large rod of iron or soft steel, both the masses being held in a vertical position, and that if the rod was first rendered magnetic by hammering, the effect on the steel bar would be probably augmented." The experiments proved the correctness of the opinion; for a small bar of soft steel when hammered on a stone or metal, free from ferruginous particles, was capable of lifting but 6½ grains of iron, by placing in on a parlour poker, both being held in the vertical position; after receiving 22 blows it raised a nail weighing 88 grains.

In the present paper, an improved process for developing a much greater degree of magnetic energy was explained; in the former experiments only one bar of iron was used, on which the wires or bars of steel was hammered, both being held in the vertical position; the magnetism of the iron being imparted in addition to that obtained by simple percussion:—in this mode of operation the magnetism of the iron bar acts only on the lower end of the steel, the magnetism of the upper end being only spontaneous, or what is technically termed, *consequential*.—An attempt was made to obtain a greater power, which was accomplished by using two bars of iron, of three feet in width and one foot in length; the steel bars for this purpose, were the eighth of an inch in diameter, and were hammered between the two iron bars.

The following are a few of the results of the experiments.—

1. By the first (or simple) process, a steel wire of about six inches in length, lifted a nail, weighing 186 grains; on being submitted to the compound process, it lifted 326 grains.

2. The softest wires obtained a greater degree of magnetism, and more readily than those which were harder, but the effect was temporary.

3. By the compound process being employed with an iron bar eight feet long, a piece of steel wire six inches in length, lifted 669 grains, or four times its weight.

4. The bars being placed vertically obtain polarity by position, which is increased by hammering them while perpendicular, the power being in proportion to the degree of percussion, the power of the steel is considered to be limited by the magnetism of the iron bars, the maximum requires both the iron and steel to be hammered for several minutes, for some days.—When the iron bars were rendered magnetic by use, a single blow would sometimes enable a steel wire to raise its own weight; the same end of the wire should always be kept downwards, which obtains northern polarity; by this means the power generally increases with each operation, —the wires should be well polished at the ends. Mr. S. imagines that percussion imparts to ferruginous particles, the disposition to assume that state which is generally called magnetic; these particles, and steel in particular, resist this to a certain extent, which is overcome by percussion. The theory laid down in this,—" That percussion on magnetizable substances, in mutual contact inclines them to an equality of condition;" which he illustrates by the fact, that all bodies when placed in contact, have a tendency to assume the same degree of temperature whatever difference may exist between them; on this principle, the fact that magnetism is both increased and diminished by percussion is accounted for, if a strong magnet is subjected to percussion

while held in the air, or placed on a body that possesses only an inferior degree of magnetic developement; its poer is diminished, and *vice versa*—bars and weak magnets obtain power by hammering them on bodies which possess it in a superior degree.

A communication by Sir E. Home, Bart. V. P. R. S. was read by the Rev. Lansdown Guilding, B. A. F. L. S. entitled "Observations on the Inguana Tuberculata, the common Guana," in which the necessity was pointed out that all animals should be described from living specimens, for the purpose of zoological illustration; several errors that had occurred in consequence of such neglect were mentioned.

February 5th.—A Paper was read by Thomas Young, M. D. For. Sec. R. S. under the title of "A finite and exact expression for the Refraction of an Atmosphere nearly resembling that of the Earth.

The Bakerian Lecture was commenced by J. F. W. Herschel, Esq. F. R. S.

February 12. The conclusion of the Bakerian Lecture.

The Lecturer considered the influence of Voltaic Electricity on Mercury and other fluid metals.

A quantity of mercury being placed in a vessel and covered with any conducting fluid, and then subjected to an apparatus of moderate power, although the wires are not in contact with the metal, it will be put in a state of violent circulation from the negative to the positive side, the action is varied according to the nature of the fluid used, the power of the apparatus, and other circumstances, but is produced in the greatest degree by the more concentrated acids:—with alkaline solutions the mercury if pure has no action, but a particle of any metal more electro-positive than mercury,—sodium, or potassium, for instance—cause a contrary action from the positive to the negative wire.

For these experiments the mercury must be recently

distilled, and rendered pure by washing with diluted nitric acid, the utmost cleanliness must be observed in all the vessels used, and no film must appear on the surface of the metal; an apparatus of eight or ten pairs of plates will be found sufficiently powerful.

Astronomical Society of London.

12th. March, 1824. The following papers were read at the meeting of this evening, viz:—

1st. A letter from Sir Thomas Brisbane, Governor of New South Wales, accompanied by observations on the Summer solstice of 1823, and the mean of 12 months' Meteorological observations made at Paramatta by M. Rumker, by which it appears the mean obliquity of the Ecliptic is made 23° 27' 44" 39, and the latitude of the place of Observations 33 48 42 61.

2nd. A Letter from Professor Sebumacker of Altona, accompanying Mr. Hanson's computations of the Elements of the Comet of 1823-4, from observations made in January 1824.

3rd. Two Letters from Mr. Taylor, Jun. of the Royal Observatory, Greenwich, containing the Elements of the same Comet, as computed by himself from the Greenwich observations of January, 1824, and a comparison of the Ephemerides of the places of this Comet, from the elements as computed by Sebumacker, Carlini, Dr. Binkley and himself with the Greenwich observations.

4th. On the rectification of the Equatorial by J. F. Littrow, Director of the Imperial Observatory at Vienna. In this paper most of the errors to which this instrument is liable in its use are pointed out, and means suggested for their rectification.

5th. On the utility and probable accuracy of the method of determining the sun's parallax by observations on the planet Mars near his opposition, by Mr. Henry Atkinson of Newcastle upon Tyne. This paper refers to the observations recommended by Mr. F. Baily, to the last meeting of the Society, and noticed in our last Number (page 158.) The author strongly recommends this mode of proceeding; and as there will be 23 oppositions of the planet Mars, between this time and the next transit of Venus, on the 8th of December 1874, he infers that all error in the sun's parallax may be nearly cleared before that event, and consequently that when it does arrive, it may be observed under very increased advantages.

A new Annular Nicrometer by Fraunhofer, which is particularly adapted to observations on Comets, was submitted to the Society's inspection by Mr. F. Baily, accompanied by a written description of the construction and mode of using the instrument, which appeared highly useful.

New Patents Sealed, 1824.

To Abraham Henry Chambers, of New Bond Street, in the County of Middlesex, Esq. for his invention of improvements in preparing and paving horse and carriage ways. Sealed 28th February: six months for enrolment.

To Richard Evans, of Bread Street, Cheapside, in the City of London, wholesale coffee-dealer, for his new invented method or process of roasting or preparing coffee, and other vegetable substances, with improvements in the machinery employed in such process and machinery, being likewise applicable to the drying, distillation, and decomposition of other mineral, vegetable, and animal substances, together with a method of examining and regulating the process, whilst such substances are exposed to the operations before-mentioned. Sealed 28th February: six months for enrolment.

To John Gunby, of New Kent Road, in the County of Surry, sword and gun manufacturer, for his new invented process, by which a certain material is prepared, and rendered a suitable substitute for leather. Sealed 28th February: six months for enrolment.

To John Christie, of Mark Lane, in the City of London, merchant, and Thomas Harper, of Tamworth, in the County of Stafford, merchant, for their invention of an improved method of combining and applying certain kinds of fuel. Sealed 28th February: six months for enrolment.

To William Yetts, of Great Yarmouth, in the County of Norfolk, merchant and ship owner, for his invention of certain apparatus to be applied to a windlass. Sealed 28th February: two months for enrolment.

To James Wright Richards, of Caroline Street, Birmingham, in the County of Warwick, metallic hot-house maker, for his invention of an improved metallic frame and lap, applicable to all hot-houses, green-houses, horticultural frames and glasses, sky-lights, and other inclined lights and glasses. Sealed 28th February: six months for enrolment.

To William Greaves, of Sheffield, in the County of York, merchant, for his invention of certain improvements on, or additions to harness, principally applicable to carriages drawn by one horse. Sealed 28th February: two months for enrolment.

To William James, of the City of Westminster, land agent and engineer, for his invention of certain improvements in the construction of rail and tram roads or ways, which rail, or roads, are applicable to other useful purposes. Sealed 28th February: six months for enrolment.

To Maurice De Jough, of Warrington, in the County Palatine of Lancaster, cotton spinner, for his new invented mode of constructing and placing a coke oven under or contiguous to steam, or other boilers, so as to make the heat arising from making coke, or other intense combustion in the said oven, subservient to the use of the boiler, instead of fuel used in the common way, and to exclude such heat from the boiler when required, without detriment to the operations of the oven. Sealed 28th February: two months for enrolment.

To Charles Bagenell Fleetwood, of Parliament Street, Dublin, in that part of the United Kingdom, called Ireland, gentleman, for his new invented liquid and composition for making leather and other articles water proof. Sealed 28th February: six months for enrolment.

To Joel Spiller, of Chelsea, in the County of Middlesex, engineer, for his invention of an improvement or improvements, in the machinery to be employed in the working of pumps. Sealed 6th March: four months for enrolment.

To John Heathcoat, of Tiverton, in the County of Devon, lace manufacturer, for his invention of a new method of manufacturing certain parts of machines used in the manufacture of lace, commonly called bobbin net. Sealed 9th March: six months for enrolment.

To John Heathcoat, of Tiverton, in the County of Devon, lace manufacturer, for his invention of certain improvements in machines now in use for the manufacture of lace, commonly called bobbin net, and a new method of manufacturing certain parts of such machines. Sealed 9th March: six months for enrolment.

To John Heathcoat, of Tiverton, in the County of Devon, lace manufacturer, for his invention of an improved economical method of combining machinery, used in the manufacture of lace, in weaving and in spinning, worked by power. Sealed 9th March: six months for enrolment.

To William Darker Mosley, of the Parish of Radford, in the County of Nottingham, lace manufacturer, for his invention of certain improvements in the making and working of machines, used in the manufacture of lace, commonly called bobbin net Sealed 10th March: six months for enrolment.

To William Morley, of Nottingham, lace manufacturer, for his invention of various improvements in machines, or machinery now in use, for the making of lace or net, commonly known by the name of bobbin net. Sealed 15th March: six months for enrolment.

To Rupert Kirk, of Osborne Place, Whitechapel, dyer, for his invention of a new method of preparing or manufacturing a certain vegetable substance growing in parts abroad, beyond the seas, and imported to, and used in these Kingdoms as a dye, or red colouring

matter for the use of dyers, called Safflower, (Carthamas) so as more effectually to preserve its colouring principle from decay or deterioration in its passage from the places of its growth to England and other parts of Europe. Sealed 20th March: two months for enrolment.

To Jean Henry Petelpierre, of Chalton Street, Somer's-Town, in the Parish of St. Pancras, in the County of Middlesex, engineer, for his new invented engine, or machine, for making the following articles from one piece of leather without any seam or sewing whatever, that is to say, all kinds of shoes, and slippers, gloves, caps, and hats, cartouche boxes, scabbards, and sheaths for swords, bayonets, and knives. Sealed 20th March: two months for enrolment.

To James Rogers, of Marlborough, in the County of Wilts, surveyor, for his new invented improved method, or improved instrument or instruments, for determining or ascertaining the cubic contents of standing timber. Sealed 20th March: six months for enrolment.

A grant unto John Lingford, of the Town and County of the Town of Nottingham, lace machine manufacturer, for his invention of certain improvements upon machines or machinery now in use, for the purpose of making that kind of lace, commonly known or distinguished by the name or names of bobbin net, or Buckinghamshire lace net. Sealed 20th March: six months for enrolment.

To John Heathcoat, of Tiverton, in the County of Devon, lace manufacturer, for his invention of improvements in certain parts of the machinery used in spinning cotton, wool, or silk. Sealed 20th March: six months for enrolment.

To Henry Berry of Abchurch Lane, in the City of London, merchant, for his invention of certain improvements on a machine or apparatus for more readily producing light. Sealed 20th March: six months for enrolment.

To Jean Jacques Stainmare, of Belmont Distillery, Wandsworth Road, Vauxhall, in the parish of St. Mary, Lambeth, in the county of Surry, distiller, in consequence of communications made to him by certain foreigners residing abroad, and discoveries by himself; for the invention of improvements in the process of an apparatus for distilling. Sealed 20th March: six months for enrolment.

D.	H.	M.	S.	
1	0	0	0	☉ declination 4° 38′ 14″ N.
1	1	20	0	☽ passes the merdiian.
1	5	29	0	♃ passes the meridian declination 23° 33′ N.
1	22	8	0	☿ passes the meridian declination 8° 38′ S.
2	19	0	0	☽ in conj. with η in Taurus.
4	0	0	0	♀ in conjunction with δ in Aquarius
4	10	54	58	♃ 2nd sat. will emerge
5	11	29	15	Im 0¼′ S. of ♃ } ♃ of the
5	12	22	15	E 5½′ N. } ☽ cent.
6	0	0	0	☉ declination 6° 32′ 40′ N.
6	6	1	0	☽ passes the meridian.
6	9	0	0	☽ in conj. with δ in Gemini.
6	10	18	0	☽ in □ first quarter.
7	8	34	0	♃ s' 3rd Sat. will emerge
7	10	10	47	♃'s 1st sat. will emerge.
7	10	56	0	♂ passes the merid. dec. 2° 48′ N.
8	8	4	26	♃'s 4th Sat. will emerge
8	10	57	37	♃'s 4th Sat. will emerge
8	17	0	0	☽ in conj. with ξ in Leo
8	21	0	0	☽ in conj. with ο in Leo
9	5	0	0	☽ in conj. with π in Leo
9	9	0	0	☿ in conj. with ξ in Pisces
11	0	0	0	☉ Dec. 8° 24′ 15″ N.
11	10	27	0	☽ Passes the meridian
13	3	47	0	Ecliptic opposition ☉ Full moon.
13	4	52	0	♃ Passes the merid. dec 23° 32′ N.
14	9	18	29	♃'s 3rd sat. will immerge.
16	0	0	0	☉ declin. 10° 12′ 20″ N
16	5	0	0	☾ in conj. with σ in Scorp
16	14	53	0	☾ Passes the meridian.
17	7	0	0	☾ in conj. with ϑ Oph.
17	9	0	0	☾ in conj. with B. Oph.
19	0	0	0	☾ in conj. with 1 ν in Sag.
19	5	0	0	☾ in conj. with ο in Sag.
19	11	0	0	☾ in conj. with Georgian. long 15° 45′ in Cap. ☾ lat. 0° 17′ N. ♅ lat. 23′ s. diff, lat. 0° 40′.
19	16	3	0	☉ enters Taurus
20	0	0	0	♅ Stationary.
20	18	0	0	☾ in □ last quarter.
21	0	0	0	☉ declin 11° 56′ 14″ N.
21	19	0	0	☾ passes the meridian
23	8	0	0	☾ in conj with ϑ in Aqua.
23	8	30	33	♃'s 1st Sat. will emerge
24	10	0	0	☿ in conj. with δ in Aries.
26	0	0	0	☉ declin 13° 35′ 18″ N.
26	22	33	0	☾ passes the meridian
27	14	0	0	☾ in conj. with η in Pisces
28	16	25	0	Ecliptic Conjunction ● New Moon.
30	1	0	0	☽ in conj with η in Taurus.
30	4	0	0	☽ in conj. with ☿ long. 28° 17″ in Taurus ☽ lat d. 3 26″ N. ☿ lat. 2° 11′ N. diff. lat. 1° 15″
30	10	26	0	♃'s 1st Sat. will emerge.

Rotherhithe. J. LEWTHWAITE.

The waxing moon ☽—the waning moon ☾.

METEOROLOGICAL JOURNAL, Feb. and Mar. 1824.

1824.	Thermo.		Barometer.		Rain in inches.	1824.	Thermo.		Barometer.		Rain in inches.
	Higt.	Low.		—			Higt.	Low	+	—	
Feb.						Mar.					
26	41	30	29,70	29,62	. .	12	42	28	29,99	29,90	,275
27	40	33	,54	stat.	. .	13	43	28	,42	—,24	,025
28	43	32	,77	29,67	.	14	48	31	,96	—,68	. .
29	41	34	,83	—, .	. .	15	47	27	,96	—,84	. .
Mar.						16	54	39	,90	—,88	,125
1	45	33	,69	—,57	. .	17	56	38	30,13	30,01	. .
2	34	27	—,58	—,55	,025	18	58	43	,16	—,15	. .
3	41	26	—,00	28,88	. .	19	59	45	,17	stat.	. .
4	38	26	,77	29,71	. .	20	52	41	,18	30,14	. .
5	52	28	,99	stat.	. .	21	49	41	29,89	29,72	. .
6	52	36	,78	29,71	. .	22	43	33	,59	—,53	,225
7	51	36	,50	—,47	,075	23	43	30	,81	—,67	. .
8	55	39	,39	—,12	,425	24	43	34	,88	—,68	. .
9	49	34	,65	—,58	,162	25	47	43	,98	—,96	,475
10	42	32	,62	—,59	. .						
11	46	29	,95	—,56	. .						

Lower Edmonton. C. H. ADAMS.

LITERARY AND SCIENTIFIC NOTICES.

Mrs. Maria Graham will publish next month, in one volume, quarto, her Journal of a Voyage to Brazil, and Residence there during part of the Years 1821, 1822, and 1823, containing an Account of the late Revolution in that country: it is to be illustrated with engravings.

Mr. J. Skelton, the Author of *Oxonia Antiqua Restaurata*, has sent into the World the First Part of his Engraved Illustrations of the Antiquities of Oxfordshire: among the Illustrations, which are very numerous, and executed in the first style, will be found a composed Frontispiece, in which is brought together many existing remains of antiquity, a Vignette of Wroxton Abbey, Stanton Harcourt Church, with Pope's Tower, and Ancient Kitchen, and the Spencer Aisle, in Yarnton Church, with many other specimens of Ecclesiastical and Monumental Architecture, &c. It is to be succeeded by eleven other parts, quarterly, and if they equal the one under notice, it will be one of the most splendid works ever issued from the British Press, and a honour to any age or country.

Mr. William Henry Inwood, the Architect to St. Pancras' Church, has in the Press, in one volume, folio, a work entitled, The *Erectheion, or Ionic Temple of Erectheus*, on the Acropolis of Athens, and other Architectural remains in Greece, with marble and terra cotta fragments of Athenian Architecture, collected and brought to England in the year 1819. The work will be embellished with Thirty-nine Plates, and a Map to exhibit the situation of the Temple of Erectheus, the Temple of the Parthenon, the Propylæm, the Temple of Victory, the Theatre of Bacchus, &c. &c. all of which are represented from original Drawings. The work will also contain an Essay on the Rise and Progress of Ancient Architecture.

DIBDIN'S MONUMENT.—Sievier, the Engraver and Sculptor, is engaged upon a Monument to the memory of that distinguished Patriot, Poet, Composer, and Vocalist, the late Mr. Charles Dibdin; report speaks highly of the modelled design, and from the specimens already produced of the artist's ability, there can be no doubt but that he will do ample justice to the work.

Mr. Cochrane, whose pedestrian peregrinations has excited so much wonder, is engaged Printing an Account of his Travels in Asia and the Northern Regions of the Dominions of the Russian Emperor. It is said that in one direction he penetrated as far eastward, through this inhospitable clime, as the provinces of Kamschatka, Ochotsk, and Tehuktchi, where he was stopped by authority. His narrative, if faithfully recounted, must be highly interesting.

The History of China is preparing for publication by Messrs. Klaproth and Ramusac, at Paris. This work, if judiciously written and contains authentic information, will be extremely desirable, as we have no work, with the exception of Du Haldé, that gives any tolerable account of this singular country and its inhabitants.

Captain Batty will in a very short time present to the public a new Graphic Work, comprising Sixty of the most Picturesque Views on the Rhine and Maine, in Belgium and Holland, corresponding with his former production on France and Germany: it will be published in parts, the first to appear in the beginning of May.

The Academy of Sciences at St. Petersburg, have just published the Accounts of John Forslan and other Arabic Writers, respecting the Russians in ancient Times. The Editor is Professor Frähn, who has added a German Translation, with Notes, and an Appendix in one volume, quarto.

LONDON:
SHACKELL AND ARROWSMITH, JOHNSON'S-COURT, FLEET-STREET.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLI.

Recent Patents.

To LOUIS JOHN POUCHEE, *of King Street, Covent Garden, in the County of Middlesex, Type-Founder, in consequence of a Communication made to him by a certain Foreigner, residing abroad, for certain Machinery or Apparatus to be employed in the casting of Types.*

[Sealed 5th August, 1823.]

THE machinery for which this patent has been obtained, is the invention of M. Henry Didot, of Paris, and is calculated to cast from one hundred and fifty to two hundred types at one operation. It consists of a mould formed by a combination of steel bars with grooves and matrices, which are secured by a frame and brace of iron, upon a strong wooden bench; and a lever carrying a heavy rammer, is intended to fall down into the middle of the mould, for the purpose of driving a portion of

fluid type metal through small apertures into the grooves and matrices, where the body and face of the letter is cast. The manner in which this apparatus is constructed will be seen in Plate XII.

Fig. 1. is a perspective representation of the bench with the moulds placed thereon: but in order to understand the operation of the machine, it will be necessary first to describe the manner in which the moulds are formed; Fig. 2 represents the several bars, that constitute one side of the mould when put together. The bar *a*, with horizontal grooves, which form the bodies of the respective types, is made fast by screws to the bar *b*, *b*, which received the matrices *c*, *c*. Each of these matrices has the face of the intended letter stamped into it, and they are so arranged that they individually stand opposite to the respective grooves of the bar *a*. On the top of the matrices the bar *d*, is fastened for the purpose of holding them securely in their places: *e* is a straight bar intended to be laid upon the bar *a*, as a cover to the grooves, in order to form the upper sides of the square recesses; *f* is called the break-bar, and is to be placed in front of the bar *a*: it has a series of small nicks, or openings, which come exactly opposite to the ends of the grooves; and through these nicks or openings, the fluid type metal is to pass into the groove and matrices, where the body and face of the letter is cast. The spaces between the nicks of the break-bar coming against the side of the grooves, are to close them and form the feet of the types. *g* is a bar, that is to be laid upon, and form the cover of the break-bar, and these when so combined, produce one side of the type mould.

In order to shew the form of the passages through which the type metal has to flow into the moulds, a section of the several bars combined, is shewn at fig 3:

h being the recess between the moulds, into which the fluid metal is to be poured to the height of the dotted line, and from whence it is ejected and driven into the moulds by the descent of the rammer, as will be hereafter described.

Fig. *k*, is a horizontal view of the mould, and part of the bench or table on which it is laid: the iron frame intended to confine it, being thrown open; the respective letters refer to similar parts of the moulds before described in figs 2, 3 and 4. The several bars being combined, and laid upon the solid metallic bed as shewn, the lateral pieces of the frame *k*, *k*, which turn upon hinge joints, are then brought to bear against the sides of the mould bars; the top piece *l*, *l*, is next placed over them, and the whole is made fast by bringing the looped part of a swinging lever *m*, fig. 1, to bear upon the nose or projecting end of the top piece *l*. This swinging lever is brought up to its bearing by means of a tongue *n*, which is forced against the lower part of *m*, by the action of the hand lever *o*.

The mould, as shewn at fig. 1, is now ready to be employed for casting. A quantity of fluid type-metal is poured (by means of a ladle) into the central recess of the mould, (as seen at *h*, fig. 3). The rammer *p*, is now to be let fall into the recess *h*, which is done by drawing the trigger *q*, when a string connected to it pulls back a bolt or catch at *r*, and the long lever *s*, instantly descends with the rammer *p*. By this means the fluid metal, previously occupying the lower part of the recess *h*, fig. 3, is displaced from thence by the rammer *p*, and having no means of escaping, is driven with great force laterally into the moulds and matrices.

The operation of casting having been thus performed, the next consideration is a mode of withdrawing the

types from the moulds. To do this the workman places his foot upon the step *t*, fig. 1, when the end of the compound lever *v*, acting against a pin *u*, under the leg *w*, throws up the lever *s*, sufficiently high for the workman to take hold of the handles *x*; he then lifts the lever until it has passed the spring catch at *r*, and there he leaves it supported as seen in the figure. The hasp *y*, in front of the table, is now raised, when the swinging lever *m*, being released, quits the tongue of the top-piece, and allows the frame of the mould to be opened as at fig. 4.

The mould and the cast within it is now removed from the bench, and placed upon a table provided with cramps, which hold the solid part of the cast, while the mould bars are carefully drawn asunder by wrenches, leaving the types standing out on each side of the cast, like the teeth of a comb; from whence they are broken off and dressed by hand in the usual way.

By this apparatus about two hundred types may be cast at one operation, and the casting repeated twice in a minute, or even quicker.

[*Inrolled, Feburary,* 1824.]

To JOHN BAINBRIDGE, *of Bread Street, Cheapside, in the City of London, Merchant, (in consequence of a Communication received by him from a Foreigner resident in the United States of North America), for certain Improvements upon Machines for cutting, cropping, or shearing, Wool, or Fur from Skins; also for cropping, or shearing Woollen, Silk, or other Cloths, and Velvets, or any other Fabric, or Fabrics, thereof respectively,*

whether made or composed entirely of Wool, Silk, Cotton, or other Materials of which Cloth or Velvet is made, or of any Mixture or Mixtures thereof respectively; and also for the purpose of shaving Pelts or Skins.

[Sealed July 31, 1823.]

THE improvements above-mentioned consist principally in the adaptation of a pair of saw-blades in place of the usual cutting knives, or cutting cylinders, employed in shearing and cropping machinery. These saws are mounted in frames, the upper one being actuated by means of a wheel, with an uneven surface, which gives it a small but rapid alternating lateral motion, and causes the teeth of the saws to perform as a series of small shears or scissors. The teeth of the lower blade raises and holds up small portions of the pile, fur, or wool, of the material submitted to its operation, while the sliding of the upper blade causes it to be cut or cropped off.

The particular construction of this apparatus, and the mode of actuating it, (as far as regards the present patent), will be seen in Plate XII. figs. 5, 6, 7. Fig. 5, is a front view of the shearing machine, part of the standards being removed. Fig. 6 is a top view of the same; and fig. 7 is a cross section (the respective letters referring to the same parts of the apparatus in each of the views), *a a* and *b b*, are two long cylindrical rollers between which the skin or cloth intended to be shorn is passed, being distended and held securely by rollers or other convenient means, not shewn in the figures. On the top of the upper roller *a*, the saws or cutting blades *c c*, are made to press, which will be best seen in the section fig. 7.

The edges of the two saws are partially shewn on a scale equal to their real size, in figs. 8, 9, and 10. Fig. 8, is the inner side of the blade with a bevelled edge; fig. 9, shews the outer side of the blade, the teeth being about 1-8th of an inch long. The two blades are set at an angle, as seen in fig. 10, the lower one being firmly fixed to the frame as at *d*, the upper one sliding laterally upon the lower. The blades are held in their angular positions by means of wedges and a series of screw bolts passed through small slots in the upper blade, by which means the bevelled edges of the saws act smoothly against each other.

A skin or piece of cloth intended to be shorn, is introduced between the rollers *a* and *b*, as seen at *e*, *e*, fig. 7; the edges of the cutters *c*, are then let down upon the skin or cloth, resting upon the upper roller *a*. Rotatory motion is now given to the rollers by means of the winch, or handle *f*. This motion is proposed to be communicated from the shaft of *f*, to the rollers through the train of wheels, as seen in fig. 5 and 6, (the particular combination of this train is not however claimed as part of the invention); the large toothed-wheel *g*, actuates a pinion *h*, on the shaft *i*, carrying the fly-wheel *k*, and also the tappet, or zig-zag wheel *l*. A bevel, or mitre-wheel *m*, (also on this shaft) actuates another mitre-wheel *n*, on the vertical shaft of which is an endless screw. This endless screw takes into and turns the toothed-wheel *o*, which by means of a pinion *p*, upon its shaft, actuates the roller *b*. At the reverse end of the roller *b*, a small toothed-wheel takes into another toothed-wheel upon the axle of the roller *a*, and thus the two rollers *a* and *b*, revolve together simultaneously, drawing the cloth or skin, progressively under the cutters.

The lower saw-blade fixed to the frame as before said, may be called the ledger blade, the upper one is the cutting blade which has an alternating motion sideways. The manner of actuating this cutter is as follows; the back edge of the blade *c*, is strengthened by a bar *s*, *s*, which is elongated through the frame of the machine, as seen at fig. 6. In this elongated part, a notch is formed at *r*, for the edge of the tappet or zig-zag wheel *l*, to work in, and as the zig-zag wheel revolves, its irregular surface works against the sides of the notch, and causes the upper saw to perform a rapid alternating lateral motion, which produces the cutting operation; the length of the cut being regulated by a shifting piece which widens or narrows the notch as may be required; by these means the fur or pile on the surface of the skin, or cloth intended to be cropped or shorn, being met by the teeth of the under cutter, it is raised and kept up, while the lateral movement of the upper cutter as above described, crops, or shears the fur or pile from the skin, or cloth, as the rollers conduct it forward.

The specification concludes by saying "I have herein described so much of the machinery as I conceive to be sufficient to render its construction and operation perfectly evident, but I wish it to be understood that I do not claim all the parts herein exhibited either individually or collectively, as the invention consists simply in the peculiar kind of cutters described above, and the mode of communicating the lateral alternating motion to the upper cutter by the zig-zag wheel, so as to effect the operation of cutting."

[*Inrolled January,* 1824.]

To John White, *of the New Road, in the Parish of St. Mary-le-bone, in the County of Middlesex, Architect, for his new invented Floating Breakwater.*

[Sealed 15th January, 1824.]

This floating breakwater is formed by a series of square frames of timber, connected together, and made secure by mooring chains or cables attached to anchors, or blocks. They are ranged in angular or curved lines, so as to produce a sea-wall or jetty, within which a considerable area is formed for the reception of ships and other vessels, where they may ride protected from the breaking of the sea or surf.

Plate XIII. exhibits the contrivance. Fig. 1. is a horizontal view of one of the square frames formed by several pieces of timber bolted together. Fig. 2, is an edge view or section from A to B. Fig. 3, is a section from C to D. The most buoyant wood is preferred and that least likely to decay in salt water; *Quebec yellow pine* is considered to be most appropriate for the purpose. The logs of wood for constructing the frames are to be square, or nearly so, from eighteen to twenty inches through, and from thirty to fifty feet long; if the logs happen to be somewhat irregular in their form, they can be notched and fitted together so as to admit of being properly bolted with iron or copper bolts, made out of two-and-a-half inch bars, or rods, which are to be passed through the logs, and well headed and secured by nuts. Straps of iron one-and-a-half inch thick and three-and-a-half or four inches wide, are to be employed for bracing the ends of the logs to make them secure, but these dimensions may be varied according to circumstances. The patentee, however, prefers laying down a greater number of the

frames to increasing their dimensions beyond fifty or sixty feet in breadth.

These frames are to be arranged in any desired form, floating upon the surface of the water as shewn in the plan of a temporary harbour at fig. 4; the frames are securely connected to each other by ropes or chain cables, lapped and shackled round the logs, and are held in their position by large chains or cables, secured to anchors or mooring blocks, as may be found most convenient, according to circumstances; the broad sides of the frames being opposed to the strongest impulse of the sea, or where it is likely to be most powerfully agitated by gales of wind, or by strong currents.

The height of these frames may be increased in places where the violent agitation of the water may require it, by adding logs or pieces of timber, on the tops of the frames not exceeding five tiers in a vertical position, similar to those logs described as constituting the frames: by which their resisting surfaces becoming elevated, will effect the breaking of the waves more completely; and when circumstances require it, these frames may be arranged in several series, in such positions and at such distances from the shore and from each other as may be calculated to protect any particular spot, and produce a pool of comparatively still water: as the floating frames will receive the waves and impede their progress by causing them to break against the sides of the logs; and it is presumed that "a cursory review of the principle and peculiarities of the Floating Breakwater, will prove its very decided superiority over Stone Piers and fixed Breakwaters."

"In the case of a stone pier, the waves impinge on a fixed surface, and an increase of agitation follows; a new current, in short, is produced on either side of the pro-

jection. The Floating Breakwater, on the contrary, presents a *yielding* surface, and a succession of yielding surfaces; a part of the wave or current passes under it, and an equalization of the waters is thus the more quickly produced on the lee side. The *modus operandi* is this: the wave first breaks upon the outer broadsides of the frames; from the buoyancy of the frame, very little of the wave is dashed backward: part of it passes under the frame, and part of it flows over; in this broken state the wave strikes on a second bar, when it undergoes the same crippling process, and so on successively to a third or fourth, till the swell, more and more enfeebled, is at length completely subdued. The fact is, a very small quantity of the strongest swells will reach the leeward side of the frame. This is the principle of the Floating Breakwater, and one which is proved to be as efficient in practice as it is satisfactory in theory."

It is considered that it may sometimes happen (from the peculiarities of situation, or from the nature of the wood of which the frames are constructed, as well as from an accumulation of sea weed,) that it may be desirable to increase the buoyancy of the breakwater. In this case it is proposed to attach empty casks, or hollow buoys to the frames, or any other suitable light articles, which place or circumstances may conveniently afford.

"Such is the nature of the materials and the workmanship, that the *expense* of such a machine, compared with that of erecting fixed structures, is at least twenty to one in its favour. But it is not in the first expense only that the advantage of the Floating Breakwater consists; it has many accessory ones. It requires no back-water to clear the harbourage it produces. It is approachable equally in every state of the tide. If properly moored, it rises and falls with the varying heights of the tide; it is al-

ways repairable with ease, and obviously at much less expense than stone work: it is capable of *removal* at any time, and to any place. This quality presents an important advantage. If a decay of trade at any place makes these Breakwaters at any time unnecessary, or a state of war renders the facilities for landing afforded by them imprudent, they are readily removed; and of course it is more advantageous to displace the apparatus at once, and without loss, and apply it elsewhere, than to break down and disperse a mass of masonry, with great labour and expense, and without the possibility of indemnification. It is particularly desirable for fishing coasts, where the surge often prevents boats from putting off and landing, and thus impedes the regular supply of the market, and makes the life and subsistence of the fishermen very precarious. It is equally applicable to bathing places. Bathing is frequently interrupted by a rough sea, to the great detriment of invalids, and the disappointment of those who bathe for pleasure. The Floating Breakwater will at all times command smooth water, and protect the machines."

[*Inrolled March*, 1824.]

It gives us great pleasure in introducing an invention which has so important an object in view as the present, to be enabled to speak of it in terms of commendation, we therefore beg to subjoin the following testimonial of its advantages, presuming that it will be more satisfactory to our readers than any theoretical opinion which we might feel disposed to offer.—*Editor.*

Deal, March 26th, 1824.

"We, the undersigned, inhabitants of Deal, have observed the temporary Floating Breakwater, moored near

the Dock-Yard, by John White, Esq. of London, and find that the work of the frame has remained firm: and although there has been a very heavy gale of wind from North to North-East with a tremendous sea, and several fresh gales from S. to S. W. it has held fast, and remains in the same position as when it was first put down. We have likewise observed that the frame has had the effect of breaking the seas, and caused smooth water for a considerable space to leeward.

(Signed) JOHN BELL, Pilot.
JOHN UNDERDOWN, Do.
EDWARD TAVENOR, Do.
Captain JONATHAN TAYLOR,
Captain LESLIE ECKLEY.

To Alfred Flint, *of Uley, in the County of Gloucester, Engineer, for a Machine for scouring and washing of Woollen Cloths.*

[Sealed 1st. November, 1822.]

This machine is intended to cleanse woollen cloths in the process of finishing them during their manufacture. It consists of a water-trough, and three indented or ribbed rollers, or cylinders, between which the cloth as it rises up out of the trough is to pass, and by being pressed between the ribs, its colouring matter is forced out.

The construction of the machine is shewn in action in (Plate XIV. fig. 1,) *a*, *a*, *a*, is the external form of the trough, which is supplied with water from the pipe *b*; *c*, *c*, are two cylinders or rollers with ribs, reeds, or flutes, along their peripheries, these are mounted on axles, resting in

frames on the side of the trough, and are turned by gear-wheels, band-wheels, or any other contrivance actuated by a first mover; *d, d,* is the cloth in an endless coil which passes over the two lower cylinders, and falls in easy folds into the water-troughs below; *e,* is the upper pressing cylinder, ribbed as the others, which squeezes the cloth into the flutes or recesses, and causes the dirt and colouring matter to drop into the box or vessel *f.*

The parts of the machine claimed by the inventor are, 1st. the ribbed rollers, or cylinders, having reeds, flutes or grooves along their peripheries, the object of which is, that the cloth may be pressed into the recesses by the ribs of the upper cylinder, and the dirt or colouring matter thereby squeezed out in a more effectual manner than has hitherto been done by plain rollers.—2nd. In the adaptation of a distinct vessel or box into which the dirt or colouring matter squeezed from the cloth, may be received and prevented from mixing with the soap and water in the trough below.—3rd. In the form of the trough which is calculated to deliver the cloth out of the water to the rollers without obstruction, and also to receive it from the rollers in easy folds, by which form of trough, it is presumed that the cloth will not be liable to be strained or torn.

The machinery may be considerably varied in form from that shewn in the figure, or even parts of the invention may be employed without taking the whole of the contrivances, as for instance, plain rollers may be used with good effect adapted to the improved water-trough and vessel for receiving the colouring matter, or two fluted rollers may be employed instead of three, when the cloth must be made to pass between them.

[*Inrolled January*, 1823.]

To JOHN FRANCIS, *of the City of Norwich, Shawl and Bombazine Manufacturer, for Improvements in the Process of making or manufacturing a certain Article or Fabric, composed of Silk and Worsted, for useful Purposes.*

[Sealed 12th April, 1823.]

THE article or fabric alluded to in the above ambiguous title is crape, and the proposed improvements seem to be rather in the introduction of some novel feature in that article, than in an improved process of manufacture. The patentee proposes to make crape with satin stripes, or satin figures raised above the surface, and this is said to be done by "forming in the ground a *Tammit work*, with or without a figure," or it may be done by a *twill*.

The crape is produced by a silk warp, interwoven with a worsted weft, and the satin stripe is formed by an additional silk warp wound upon a distinct roller, or beam, from that which carries the foundation warp. The mode of producing this satin stripe or pattern, is not different from that usually resorted to in weaving twills or figured goods, that is, the warp threads must be connected to the headles, and drawn according to the twill or pattern required. There is no description of the particular mode of working the loom given in the specification, and it appears to be presumed by the patentee, that the method of effecting the object, is sufficiently obvious from the above explanation.

[*Inrolled June*, 1823.]

To MATTHEW WILKS, *of Dartford, Kent, Seed-crusher, for his Method of refining Oil produced from Seed.*

[Sealed 20th December, 1822.]

THE method adopted by the patentee in purifying oil produced from linseed, or any other description of seeds is simple, and consists in the following process:

Into two hundred and thirty-six gallons of linseed oil, or oil procured from any other seed, six pounds of oil of vitriol is to be poured and well mixed by beating and stirring for about three hours. Six pounds of Fuller's earth is then mixed up with fourteen pounds of hot lime, and these matters when properly incorporated together, are thrown into the vessel containing the oil and vitriol, when the whole is to be kept in complete agitation for about three hours.

The above mixture is now to be introduced into a boiler containing a quantity of water equal to that of the oil, and the whole boiled together for three hours, keeping it continually agitated during the boiling.

The fire is now to be withdrawn from the boiler and the materials within allowed to cool, after which the water is to be drawn off and the oil will be found clarified, which after standing for some time will be fit for use.

Inrolled June, 1823.

To THOMAS LINLEY, *of Sheffield, Yorkshire, Bellows-maker, for his Method of increasing the Force or Power of Bellows.*

[Sealed 20th December, 1822.]

THE means by which this object is to be obtained, are by no means intelligibly set out in the specification,

though the description is extremely verbose. The improvements are stated to apply to the ordinary heart shaped bellows, and also the circular-formed bellows, but to explain them we feel perfectly at a loss. The object appears to be to emit an uninterrupted uniform blast from the bellows, which is already effected in several kinds of bellows, and, if we mistake not, by means very similar to those proposed by the patentee.

The principle feature which appears to be claimed as new, is the intervention of certain boards or partitions, dividing the bellows into several compartments, with valves opening upwards There is as usual a large air-valve at bottom of the bellows, and in addition to this a horizontal passage proceeds from an aperture in the side, which is formed through one of the partitions or boards, and appears to be intended to admit air. There is likewise a flexible pipe or tube for conducting the air from the upper compartment of the bellows to the nozzle. The flaps are loaded with weights, and by these contrivances an uninterrupted blast of wind is pressed out at the nozzle, both by the rising and falling of the lever which works the bellows.

We have perused the specification several times, and though the subject is certainly not one of a subtle or complicated nature, are unable to give any more than the imperfect description above.

[*Inrolled February*, 1823.]

To MILES TURNER *and* LAWRENCE ANGELL, *of Whitehaven, in the County of Cumberland, Soap Boilers, for their Invention of an Improved Process to be used in the Bleaching of Linen, Cotton, Yarn, or Cloth.*

[Sealed 24th July, 1823.]

THIS invention, is the mixing of a chemical compound to produce a bleaching liquor of a new kind. The materials are alkaline sulphuret broken into small pieces and mixed with quick lime, in the proportion of about eight bushels of lime to fifteen or sixteen hundred weight of sulphuret. These substances are to be thrown into a soap-maker's vat, having a quantity of straw, cinders, gravel, or other porous material, placed at the bottom for the liquor to filter through, and then the vat filled with water. After standing a proper time the water is to be drawn off, which will be found to be a bleaching liquor, of superior quality.

A second vat, with a filtering material at bottom, may be placed above the first, and the sulphuret and lime which remains undissolved in the first vat may be emptied into the second vat and a fresh charge of water poured upon it. The lower vat is then to be re-charged with sulphuret and lime, and the water in the upper vat having remained a sufficient time, is to be filtered into the lower vat, and allowed to stand as before, when it is again drawn off, and is ready to be employed as a bleaching liquor. By repeating this process, all the valuable matter is extracted from the sulphuret and the lime, and what remains in the upper or weak vat, which has had two doses of water, will be only useful as soaper's waste.

The liquid being so produced should be diluted with water till it shews by the hydrometer about the same density as the bleacher uses his leys of potash for the

same purpose, and the yarn or cloth must be bucked or boiled in it. The bleacher may then proceed in the usual manner, by exposing the goods operated upon to the atmosphere, oxymuriatic steeps, sours, &c. by using this ley, in boiling and bucking, as a substitute for potash.

But a process of bleaching which constitutes one of the features of this invention is, to take the yarn or cloth immediately from boiling in the prepared ley, and to immerse it in any cheap acid (as oil of vitriol), after this, steeping and washing it in oxymuriatic acid of the ordinary density used by bleachers, and then boiling in the said ley, and steeping and washing as before several times over, without exposure to the atmosphere, until the fabric so operated upon has become perfectly white.

Inrolled September, 1823.

To James Rawlins, *of Penton Place, Pentonville, Middlesex, Gent. for a Bedstead Machine or Apparatus for the Relief of Invalids.*

[Sealed 22d April, 1823.]

This invention is described as "An improved mode of constructing a bedstead whereby the patient can be raised and the bed made without inconveniencing him; also the upper part of the body and the lower limbs can be raised and supported in various positions, for the ease of the patient, and for surgical operations; and for enabling him to use the bed-pan for the offices of nature with cleanliness and comfort to himself."

This apparatus is shewn in perspective in Plate XIV., Fig. 2. The frame of the bedstead is made much in the

usual way, and may be varied in form and fashion at pleasure. Fig. 3, shews the lower part of the bedstead, the sacking being removed; *a a*, fig. 2, is a moveable frame, to which the sacking is attached, and braced in the usual way. This frame is suspended at its corners, by ropes passing over pullies *c c*, and is drawn up, as at fig. 2, by turning the winches and axle *b b b*, fig. 3, or it is let down as at *d d*, fig. 2, resting on ledges in the lower part of the bedstead. Various parts of the mattrass are made to rise by joints in the frame, for the purpose of affording ease to the patient, as the head-part *e*, which is drawn up by a cord, and is supported behind, at any elevation, by legs falling into notches; the foot-part may also be elevated as *f*, and supported in a similar way; or there may be a double joint as seen in fig. 4, and the centre part may be removed as at *g*, for the purpose of introducing the night pan. The hind part may also be made capable of rising in different positions, and of being supported as fig. 5. The swinging frame may be removed, and the bedstead converted into one of ordinary appearance, in a few minutes, if required.

Inrolled October, 1823.

We cannot help feeling surprise at seeing this bedstead become the subject of a Patent as the invention of Mr. Rawlins, when it is so generally known that Mr. Earle, Assistant Surgeon of Bartholomew's Hospital, presented the same invention for the relief of invalids and patients under surgical treatment, to the Society of Arts, in the early part of the year 1821; and from the distinguished approbation then bestowed upon it by Drs.

Powell, Carpue, Copeland, Hunt, Darling, and several other medical gentlemen, the Society conferred upon Mr. Earle their highest reward, *The large Gold Medal*, (see Vol. XXXIX. of their Transactions.) In the third Vol. of our Journal of Arts, page 140, we have described Mr. Earle's bedstead, with a representation of it; and which certainly possesses, in our opinion, advantages over the present. We can scarcely suppose, after so much publicity has been given to Mr. Earle's invention, that any one at all acquainted with the practice of Surgery can be ignorant of it, and really think that some explanation is necessary to qualify what appears to be a barefaced piracy of another man's invention, and a gross imposition upon the public.—*Editor.*

To ARCHIBALD BUCHANAN, *of Catherine Cotton Works, one of the Partners of the House of James Finlay and Co. Merchants in Glasgow, for his Invention of an Improvement in the Construction of Weaving Looms impelled by Machinery, whereby a greater quantity of Cotton may be Woven in a given time, without injury to the Fabric, than by any application of Power for that purpose heretoforeemployed.*

[Sealed 10th October, 1823.]

THE object of this improvement is to obtain a variable speed in the vibration of the lay of a power loom, which is desirable in order that the lay may be as nearly stationary as possible at the time that the shuttle is passing through the divided sheds of the warp, and that it may

move with a rapid smart stroke when beating up the weft. The invention therefore is confined to that part of the machinery which actuates the lay, and consists in the adaptation of two excentric toothed-wheels, A and B, fig. 6, Plate XIV. The lay *a* vibrates upon centres at the bottom of its legs *b*, and is connected to the excentric wheel B by the crank rod *c*. This wheel B receives its rotatory motion from the larger excentric toothed-wheel A.

The manner of forming these excentric wheels is thus described in the specification: "Their circumference in which the teeth are cut deviate from the common circular form in such ratio as may be required in order to give the desired motion to the lay. In order to construct such a wheel A, as I use in weaving plain cloths, and which is fixed upon the treadle shaft, the following description and explanations if carefully attended to will be sufficient. Its greatest diameter being about 19 inches, and its smallest diameter about 16 inches, its deviation from the circular form amounts to about three inches. This deviation however may be increased or diminished at the discretion of the constructor, and according to the variation of velocity which he wishes to communicate to the reciprocating motion of the lay.

"To obtain the proper curve of excentricity, let two concentric circles be drawn corresponding with the greatest and smallest diameters. Divide these circles into any convenient number of equal parts, as for example 64, and draw radii from the centre to the points of division in the external circle. Divide the space between the circles into the same number of equal parts with the circumference, one of which being set off upon the first radii, two upon the second, and so on progressively until the whole are set off, points will be obtained through which a curved

line being drawn, the required form of the circumference will be marked off upon each quadrant of the wheel. The highest points, as will appear by the drawing, are at the two extremities of a diameter line bisecting the external circle, and the lowest points at the extremities of another diameter line bisecting the internal circle at right angles to the former. The form thus obtained, bears some resemblance to an ellipse with its conjugate and transverse diameters.

"The wheel B must of course be constructed so as to correspond with, and work into the wheel A. To effect this, it is merely necessary to draw circles, as in the former case, corresponding with the greatest and with the smallest diameters required. Then set off one half of the radii drawn upon the wheel A, the wheel B being half its diameter, and add progressively to each radius of the wheel B as many equal parts as were taken from each corresponding radius of the wheel A, and *vice versâ*. The semi-diameter of the wheel B will thus correspond in every point with each quadrant of the wheel A, and the wheel B, will revolve twice whilst the wheel performs one revolution, as before stated. Thus communicating two accelerated strokes to the lay for each revolution of the treadle shaft moving the wheel A. The circumferential forms of both being thus obtained, the teeth are to be rounded off so as to work properly into each other, in revolving upon their respective axles.

"Though the wheel A will thus produce two revolutions of B other proportions may be adopted when deemed expedient, and as may suit the motions to be communicated to a greater number of treadles for weaving plain, twilled, or figured cloths. Those conversant with the art of weaving will at once perceive that a varied speed applied to the reciprocating motion of the lay is of the greatest

advantage, and such as will keep the lay as nearly stationary as convenient at the point when the shuttle is thrown across the web, and when the shed, or divided portions of the warp are sufficiently open to allow the shuttle to pass without injury to the warp threads. The lay in returning drives up the woof or weft to the fell or verge of the cloth with a smart stroke, whilst the shed or divided portions of the warp are closing upon it, and when the least tension is given by the treadles to the warp threads."

It is stated by the patentee, that in a loom with such excentric wheels the operation of weaving may be greatly facilitated, and that he projects the shuttle across a web of a yard wide at the rate of one hundred and thirty times per minute, without producing more breaking of the threads than usually occurs in looms driven at the rate of eighty or ninety shoots per minute.

The construction of the mechanism of this loom and its operation does not materially differ from other power looms, therefore a minute description of its parts becomes unnecessary, and particularly so, as nothing is claimed by the patentee except the excentric wheels. Its movements however may be better understood by the general reader by the following explanation.

Motion is communicated from any first mover by a band passing over a pulley, on the shaft of which is a pinion taking into a toothed-wheel attached to the reverse end of the axle of the excentric wheel A. This wheel being thus made to revolve, carries round the excentric wheel B, and a crank arm or rod *c* leading from this to the lay *a*, causes the lay to vibrate with a variable speed, as before said. Upon the shaft of the wheel A, there are several excentric rollers as *d*, called wipers, which as the axle goes round press upon one or other

of the treadles *e e*, and cause the headles *f*, to rise and fall so as to open the sheds of the warp *g g* at proper times, in order to permit the shuttle to pass to and fro, and effect the intervention of the warp and weft threads, which is beaten up by the reeds on the return of the lay.

The shuttle is projected or pecked to and fro by springs in the boxes at the ends of the lay in the usual way, (see Bowman's Power Loom, Vol. II. Page 161,) and when the shuttle fails to enter the box, a catch *h* falls down, and strikes against a pin *i*, which stops the loom. Palls are placed so as to be acted upon by the vibration of the lay, which taking into a ratchet-wheel on the reverseside of the loom, causes the roller *k* to draw off the cloth progressively as it is formed in the loom; and a shaft with an endless screw taking into a toothed-wheel on the axle of the warp roller *l*, by similar means causes the warp to be given out with the same progression.

Inrolled December, 1823.

To JOHN DOWELL MOXON, *of Liverpool, in the County of Lancaster, Merchant and Ship-owner, and* JAMES FRASER, *of King Street, Commercial Road, in the County of Middlesex, Engineer, for certain Improvements in Ships cabooses, or hearths; and also for an Apparatus to be occasionally connected therewith, for the purposes of evaporating and condensing Water.*

[Sealed 26th December, 1822.]

THE improvements which form the subject of this patent have three objects: first, an eligible disposition of

parts constituting a cooking apparatus particularly adapted to be used on ship-board; second, a mode of evaporating sea-water, and of condensing the steam into fresh-water for the use of the ship's company; and third, a mode of ventilating the ship by rarefying the air in a descending tube, and thereby producing a strong current; both of which second and third objects are effected without increasing the consumption of fuel necessarily employed in cooking only.

Plate XIV., fig. 7, is a section of the caboose or cooking apparatus, the evaporating part being behind and not clearly seen in this figure; *a* is the fire place with open bars in front. This fire-place stands out from the boiler, and is covered on the top by a plate *b*, which stands up or falls down upon a hinge as may be desired, which consequently affords the convenience of an open fire for broiling, or a hot plate for stewing, &c. The flame of the fire passes along the flue *c*, and under the boilers *d d*, to the chimney *e*. The top of the boilers are closed by covers *f f*, the edges of which fall into grooves filled with water, and thereby forming water valves, prevent the escape of the steam. These covers take off, and by that means access is obtained to the cooking kettles *g g*, within; *h* is the oven, the door of which is on the side; that part of the oven in contact with the fire is made particularly thick, in order to prevent the fire from acting too powerfully upon the interior: a recess is made in this part through which a small portion of cold air may be occasionally admitted as a damper; there is also a pipe *i*, for the steam to escape from the things which are baking within the oven.

Fig. , is a section of the condensing apparatus as it is proposed to be connected with the boiler *d*, described in the preceding figure. From the interior of the boiler,

the pipe j extends to the condenser and carries the steam evaporated from the sea-water in the boiler to the upper chamber k k, here the steam becomes cooled down by the sides of the vessel being opposed to the atmospheric air, and from hence proceeds through a small opening in the bottom of the chamber into the second chamber l l, and so on to the third or lower chamber m m, where the steam becomes ultimately condensed into pure distilled water, and is thence drawn off by a cock.

The cooling of the steam in this condenser is greatly facilitated by an air-pipe n n, which is open at both ends, and passes through the three steam chambers of the condenser. This pipe becoming heated by the surrounding steam causes a very considerable current of air to pass through it, which circumstance is taken advantage of and applied to ventilating the ship, as observed under the third head. The lower end of this pipe n is intended to have a communication with the cabin and other parts of the ship below deck, and as the heat of the pipe produces a rarefaction of the air within, it follows that the air from below will be rapidly drawn up through this pipe and, the very desirable object of ventilation easily and effectually accomplished.

The invention, as before said, is arranged under three heads, which may be considered as distinct from each other. First, the cooking apparatus, which is claimed by itself as a new disposition of parts, and it may or may not be connected to the evaporating and condensing apparatus; secondly, the evaporating and condensing apparatus, which may or may not be employed for ventilation; and thirdly, the air-pipe adapted as above, and applied to the purposes of ventilating the ship.

[*Inrolled March,* 1823.]

Original Communications.

For the London Journal of Arts, &c.

On the Phenomenon of LIGHT, *by* JOSEPH LUCKCOCK, ESQ. *Edgbaston, near Birmingham, being a continuation of the paper on Heat, from page* 198.

LIGHT being a modification of heat, it will be necessary to dwell on this part of the subject.

"Light, is that principle by which objects are made perceptible to our sense of seeing; or the sensation occasioned in the mind by the view of luminous objects."—(Dr. C. Hutton.)

The nature of light has been a subject of speculation from the first dawnings of philosophy. Empedocles, Plato, Pythagoras, and Aristotle, all took a part in the discussion; but to bring the subject nearer to our own times, Huygens and Des Cartes maintained that light arose from vibrations of a rare elastic medium which fills all space, or that it is an invisible fluid present at all times and in all places, which by some law of nature is set in motion producing light.

But the Newtonians maintain, that light is *not* a fluid perse, but consists of a great number of very small particles, thrown off from the luminous body by a repulsive power, with an immense velocity, and in all directions. And these particles, it is also held, are emitted in right lines, neither is it possible to make them move in the arc of a circle, ellipsis, or other curve.

Reaumer and Bradley taught that light is about eight minutes in passing from the sun to the earth, so that it may be considered as moving at the rate of 200,000 miles in a second; and that if the sun should be annihilated,

we should see it for eight minutes after that event should happen; and if it were again created, we should not see it till eight minutes afterwards. The distances of the fixed stars are so immensely great, that from the nearest of them, supposed to be *Sirius* or the Dog-star, light takes up many years in travelling to the earth.

To the doctrine concerning the materiality of light, and its amazing velocity, several objections have been made, of which the most considerable are that, as rays of light continually pass in different directions from every visible point, they must necessarily interfere with each other in such a manner, as entirely to confound all distinct perception of objects, if not quite to destroy the whole sense of seeing: not to mention the continual waste of substance which a constant emission of particles must occasion in the luminous body, and thereby since the creation must have greatly diminished the matter in the sun and stars, as well as increased the bulk of the earth and the planets by the vast quantity of particles of light absorbed by them in so long a period of time.

But it has been replied by Newton, that if light were not a body, but consisted of mere pressions on a fluid medium, it could never be propagated in right lines, and light was never known to move in any curve.

It must be acknowledged, however, that many philosophers, both Englishmen and foreigners, have recurred to the opinion, that light consists of vibrations propagated from the luminous body through subtle etherial medium.

Dr. Franklin expresses his dissatisfaction with the doctrine, that light consists of particles of matter continually driven off from the sun's surface, with so enormous a swiftness. Must not, says he, the smallest particle conceivable, have, with such a motion, a force exceeding that of a twenty-four pounder discharged from a cannon?

Must not the sun diminish exceedingly by such a waste of matter? He conjectures that all the phenomena of light may be more properly solved, by supposing all space filled with a subtle elastic fluid, which is not visible when at rest, but which, by its vibrations, affects that fine sense in the eye, as those of the air affect the organs of the ear.

No sound without vibration,
No light without motion.

The celebrated Euler has also maintained the same hypothesis, and besides the objection already mentioned, he doubts the possibility, that particles of matter, moving with the amazing velocity of light, should penetrate transparent substances with so much ease: in whatever manner they are transmitted, those bodies must have pores, disposed in right lines, and in all possible directions, to serve as canals for the passage of the rays; but such a structure must take away all solid matter from those bodies, and all cohesion among their parts, if they do contain any solid matter.

Dr. Horsley took considerable pains to obviate the difficulties started by Dr. Franklin. He thinks it possible, that light may be produced by a continual emission of matter from the sun, without any such waste of his substance as should sensibly contract his dimensions within any moderate length of time. He proceeds by calculation to shew that the greatest stroke which the retina of a common eye sustains, when turned directly to the sun in a bright day, does not exceed that which would be given by an iron shot, a quarter of an inch diameter, and moving only at the rate of *an inch in three weeks! !*—What possible affinity?

Mr. Melville observes, there is probably no physical point in the visible horizon that does not send rays to every other point, unless where opaque bodies interpose. Light in its passage from our system to another, often passes through torrents of light issuing from other suns and systems, without ever interfering, or being diverted from its course. To account for this fact, he supposes that the diameters of the particles of light are incomparably less than their distances from one another, which obviates, he thinks, the objections urged by Euler and others against the materiality of light.

Canton and D'Arcy have come to this conclusion, that if we allow the seventh part of a second between the emission of each particle, an interval of 20,000 miles may be admitted between every two successive particles.

Homberg and Hartsoeker made pretensions of proving the materiality of light, by their impulses thrown upon the end of a lever, from which they inferred the weight of the particles of light. But Du Fay and Mairan exposed the fallacy of their experiments, the effects produced arising from currents of heated air from the burning glass they used.

Mitchell proved by calculations that particles of light issuing from the sun had only decreased since the creation, or 6000 years, a quantity which would shorten his semidiameter no more than about 10 feet, equal to $\frac{1}{50}$ of an inch per annum. Allowing this still, it is an imperfection in creation to waste at all—a supposition unwarrantable.

Dr. Hook shews that the expansion or extension of any portion of light is inconceivable, and as unlimited as the universe, which he proves from the immense distance of many of the fixed stars, which only become visible to the eye by the best telescopes. Nor, adds he, are they only the great bodies of the sun and stars that are thus liable

to disperse their light through the vast expanse of the universe, but the smallest spark of a luminous body must do the same, even the smallest globule struck from a steel by a flint.

Newton has also put a query, whether light and common matter are not convertible into each other.

Thus far is a summary of our present knowledge concerning light. But before we proceed to examine for ourselves, considering experience superior to theory, taking common sense by the hand, in preference to all the hypothesis ever invented, we will go back to the oldest record we have on this subject: Moses says, Genesis, c. i. 3rd, 4th, and 5th ver. that "God said, let there be light! and there was light; and God saw the light, that it was good; and God divided the light from the darkness, and God called the light Day; and the darkness he called Night, and the evening and the morning were the first day." Now this is in direct contradiction to the modern doctrines about the sun's rays, and their inconceivable rapidity; for Moses positively says, that the sun was not created until the fourth day; there had been three successions of day and night, during which the heavens were a complete blank; during three days and three nights, Moses declares, there were neither sun! moon! or stars! It is difficult in the present day to understand what is meant by three days and nights, in the total absence of the sun: some have supposed them to be periods of a thousand years; there appears an intimation that the diurnal motion had an existence, and according to the modern philosophy, the earth during these periods must be flying off in a tangent, by means of the centrifugal force; and which it would have continued for ever, had not the sun been sent after it, to arrest the earth in its pro-

gress by its centripetal force, after the lapse of three thousand years.

It is said, that the light consists of particles of the sun driven off in all possible *directions*, by a force that exceeds all human comprehension. If we only analyze the words, *all possible directions*, we shall see that the proposition is a complete absurdity. The first and most obvious direction of the sun's rays may be well explained by an apple stuck full of pins, all being radii pointing to the centre, the divergence of the rays at the planet Jupiter, Saturn, or the comets in their aphelion, would be so great, that only one particle could strike the eye at a time, the eye not affording field of sufficient breadth to see two at once in the same parallel, this particle could not afford us a picture of the sun, it could be the representation only of a point.

Another obvious direction of the sun's rays, would be in cones, no other form being capable of painting the sun's hemisphere upon the retina, but consider the innumerable myriads of particles, all converging to a point, the mind of man cannot comprehend these myriads of particles, all darting at once from a surface of a million times a million of square miles, which particles from a luminous body, must touch, must be in contact, at the instant of commencing their voyage, and yet this innumerable mass of particles must converge, and be compressed into the small compass of the pupil of the eye—but this is a mere nothing, for if we multiply this incomprehensible quantity by the number of sands on the sea shore, we shall then be but upon the threshold of our calculation. The eye cannot move either high or low, east, west, north, or south, in every inch of every point of the compass, without encountering new cones of light, all issuing, and all striking

the eye at the same instant; but this even is not all, for every inch, nay, every point, of universal space must have a separate cone of light directed upon it!! No human being has powers of comprehension to understand what we are required to believe, and yet this is the modern philosophy!!

Light has been taught to be about eight minutes in passing from the sun to the earth, or about 200,000 miles in a second. The earth is about 8000 miles in diameter, or not a great way off 25,000 miles round it; eight times round the world is 200,000 miles, consequently light must travel from the sun with the amazing rapidity of eight times round the globe in a second of time! It would have been much better for astronomers to have acknowledged their ignorance of the phenomena of the eclipses of Jupiter's moons, than to have required our assent to such an egregious absurdity. We are also required to believe, that if the sun were to be annihilated, we should see it eight minutes after such event should happen. Now if it was to be annihilated, we could no more see it than if it never had an existence; it is impossible to see the thing that is not; the image upon the retina must be produced by the circular cone of rays, little luminous globules, separated from the body of the sun, like the sparks from a smith's forge,—and if this be true, no man hath ever yet seen the sun, vision being produced by the little luminous globules, or sparks, independent of the sun's orb. Now these luminous bodies are not only seen when they strike the eye, but they must be visible on our right, on our left, and over our heads, exactly the same as the sparks from the forge; and there are few of us that would think it necessary for those sparks to enter the pupil to render themselves visible, for surely it will not be argued, that light which is present to us, is not

light until it is reflected; or that light is invisible excepting in one direction, and that to be seen, it should be necessary for the eye to meet it in its course. Then, a very obvious question occurs, why are the sun's rays not seen at midnight, passing upwards from every point of the horizon, encircling the globe with a cylinder of light, converting the night into day? We are here compelled to fly for assistance to Huggins and Des Cartes, they maintained that light arose from vibrations of a rare elastic medium which fills all space, or, that it is an invisible fluid present at all times and in all places, which by some law of nature is set in motion producing light.

It is generally understood, that above our atmosphere there is not that diffusion of light we experience in our globe, that without the aid of the atmosphere, if we turned our back upon the sun, we should be enveloped in thick darkness. Light is entirely an electric phenomenon, for without the electric fluid, there would be neither heat nor light. Our atmosphere consists of two solid substances, dissolved in the electric fluid, or fluidium; one of which, *nitrogen*, is classed with inflammable substances, and its natural state of electricity is *positive*, the other *oxygen*, is a supporter of combustion, and in a contrary state of electricity, or *negative*; and "light," says Sir. H. Davy, "is the result of the actions of any substances possessed of strong chemical attractions, or different electrical relations;" and all that has been said on heat also applies to light; for heat, and light, and fluidium, are different states only of the very same imponderable substance. They are exhibited to the senses in the grand laboratory of nature, by the union of ponderable matter, *positively* electrified, with other ponderable matter, *negatively* electrified; this is beautifully illustrated in the union, or even bare contact, of two clouds in a thun-

der storm, one positively electrified, the other negatively; the same clouds will sometimes repeatedly change their electrical relations, which is seen in the alternate changes of darkness to light, in rapid succession.

Although the modern philosophy has filled all space with the luminous globules issuing from the sun, that have been sailing in right lines in all directions ever since the creation, to infinity, the elasticity of our faith must be put to a much more severe trial: all the mass of myriads before enumerated of luminous points, must be multiplied by all the fixed stars, for one of the articles of our creed runs, that rays of light are pushed off from *all* the heavenly bodies; that those from Sirius are individually many years before they arrive upon our globe; and that there are many stars, so immensely distant, that the first ray pushed off in the direction of the earth has not yet reached us although it has been travelling at the rate of 8 times round the earth in a second. Is it not astonishing, that amidst such a mass of light, such a mass of luminous points, that all distinctness of vision should not be entirely lost, and that the blaze should not be so immensely great, as to produce universal day, to the total exclusion of night.

Our modern creed gives us a very curious proof, why the rays of light of the most distant stars have not yet had time since the creation to reach our earth; because *some of them can be seen, with a powerful telescope, that are not to be seen with the naked eye;* what an absurdity to admit that the ray passes through the object glass, through the tube, through the eye-glass, through the pupil of the eye to the retina, and yet after removing the telescope, to say that the star is at such an immense distance, that although its rays are on the road, they have not yet had

time to reach the earth! If the rays had not yet reached the eye, neither could they the telescope; no perception could possibly take place till the ray should touch the retina; but the rays of light of those stars that are invisible to the naked eye, we may rest assured never will be visible, even were we to wait a million of ages for the event; whereas, if the opposite hypothesis were entertained, the new arrivals of particles of light on the confines of our system from stars in the vast expanse, travelling ever since their creation at the rate of eight times round the earth in a second of time, would give new employment to astronomers to announce the daily appearance of these new suns to the world.

The next article of our creed is, that if light were a fluid per se, its effects could not be propagated in right lines. This observation could only arise from an ignorance of that fluid; the heads of the theorists were pre-occupied with that terrible enemy of common sense, *a vacuum.*

"Again, a continual emission of matter from the sun may very easily be allowed, seeing that only 10 feet thick has escaped from his body in 6000 years." What a clumsy apology for the Diety, that he had made the sun to rule the day, to give light and heat to animate the world, and that these sage philosophers have discovered that it is wearing out, and in time will become totally extinct.

The last article is, that there is no physical point in the visible horizon that does not send rays to every other point, and that light in passing from one system to another has to encounter torrents of light issuing from other suns, and other systems, which is all very easily accomplished by nature, after she has dispatched one ray, waiting until it has travelled 20,000 miles before another is dispatched

after it, (What can propel them with this force and regularity?) and that the expansion or extension of light is inconceivable, and as unlimited as the universe, whether it is emitted from the sun, or a spark struck from a flint and steel. So that all the lights that ever were lighted since the creation of the world are still in existence, darting through space in right lines at the rate of 8 times round the world in a second; and the force of light, we are also taught, to be equivalent to an iron shot a quarter of an inch in diameter, moving at the rate of one mile in three weeks. Really, the best answer that can be given to these profound conceits is, notes of admiration, in three times three !!! !!! !!!

(To be concluded in our next.)

To the Editor of the London Journal of Arts, &c.

OIL AND COAL GAS.

As I do not consider the *coal gas* companies by any means entitled to reap the fruits of my labours and enquiries into the secrets, &c. of the several *oil* gas works, it is my intention to defer any further *exposé* of them until the present *Oil* Gas Bill shall be decided. Indeed, I should not have published the Bow affair, in your last number, had I not been urged to it by a consummate piece of *effrontery*, on the part of Mr. Taylor, in declaring before a Committee of the House of Commons, on the 17th of March last, that the affairs of the *Oil* Gas Works at Bow had been "*abominably and shamefully mismanaged!*" This, from *him*, did provoke the disclosure, which I dare him to deny; and which you must allow his declaration fully merited.

Your's, &c.

A. H.

Novel Inventions.

Perkins's Steam Engine.

Mr. Perkins has, we understand, at length demonstrated the power of his engine to a select party of friends, by lifting a given column of water through a certain space; but we have none of the particulars relative to the experiment, and therefore decline making any further remarks upon the engine until our own personal observations enable us to state such facts as will be conclusive. We mention the invention, however, at present, for the purpose of introducing a pamphlet which Mr. Perkins's is now circulating gratuitously among his friends, and as it contains several novel and interesting scientific facts, we shall present our readers with a short abstract of its contents.

The preface, which is comprised in a very few lines, informs us that the object of the work is to state principally the new *practical* rather than the *philosophical* facts which have transpired while experimenting on the New Steam-Engine of which it treats. "My apology," (says Mr. P.) "for coming before the public at so early a stage of the invention is, that as facts are the ground work of theories, they are of the greater importance; and as much time will necessarily be absorbed in giving a theory properly tested by experiment, I have considered that the practical part of the community, at least, would not be displeased by my laying before them the results which have been already unfolded, with a promise that a supplement shall follow, as soon as time will allow."

Mr. P. states, that having many years since witnessed some facts relative to steam of high expansive force, as employed by the late Mr. Oliver Evans, he was satisfied that making use of steam merely to form a vacuum, for the purpose of using atmospheric pressure, was not taking all the advantage which that extraordinary agent possessed. When he reflected upon the almost infinite power that is sometimes displayed in the eruptions of Mount Vesuvius, throwing up incalculable masses of matter into the very clouds, he was induced to consider how this immense power could be generated. "How is it that this power is so wonderfully great? Is it not high elastic steam?" The thought struck him that it must arise from the water being confined by pressure until it became sufficiently charged with heat to enable it to rend asunder whatever confined it, thereby driving every thing before it. The tremendous power of steam is frequently rendered evident in Iron Foundries: if by accident a drop of water has found its way into the mould, the steam there generated has sometimes caused an explosion that scattered the fluid metal in a shower to a considerable distance, and every carried it through the roof of the foundry; yet a thousand times that quantity of water thrown *upon* the heated metal would be perfectly harmless.

From the very great interest which is excited in this country relative to steam-engines, Mr. P. was induced, soon after he came to England, to turn his attention to the subject, and at first intended to follow up the ideas of Mr. Evans, relative to high pressure, and to do that which the imperfections of workmanship in America had prevented Mr. E. from accomplishing, being fully convinced that the exertion of power in the steam increased in a very different ratio to the quantity of fuel consumed. This being the case, it became evident that the higher the steam the

greater the economy of fuel. But in pursuing the subject it occurred to Mr. P. that much of the conducting power was lost by *steam being formed at the bottom of the boiler*, which is the case when ebullition begins; and it frequently happens that the ebullition is so great as to form one sheet of steam at the bottom of the boiler, which bottom becomes red hot, and instead of giving off its heat to the water, is suffered to escape by radiation. To prevent ebullition, therefore, and compel the water to take up the heat, seemed desirable, and this was only to be accomplished by pressure, that is, by confining the column of water within a close vessel, in the manner described in Mr. P.'s Specification. (See Vol. VI. of this Journal, page 1.)

Another very considerable loss of heat is sustained by the condensing apparatus commonly employed, in which out of 1170 degrees of heat absorbed in generating the steam, 1070 is absolutely lost by entering into the condensing water. To arrest as much of this heat as possible was the next object of Mr. P., and in effecting this much time has been expended, and many experiments have become necessary, though finally so complete has been the success of the experimentalist, that nearly "*all the heat has been absorbed from the steam and returned to the generator.*" The mode by which this has been effected, is described under the fifth head of Mr. P.'s Specification, page 1, of our present Vol.

There is also more loss of heat occasioned by the common mode of supplying air to the furnace than is generally supposed. To prevent the escape of heat up the chimney, which necessarily takes place when combustion is effected by draft, Mr. P. has adopted a plan for "*forcing* the air into the furnace, which is so constructed as to have the air pass over its heated surface, thereby taking with it the radiant heat." This mode of forcing the air in at the top

of the furnace, not only causes the smoke to be consumed, but renders the fire hottest at top. By this contrivance no smoke will be emitted, to annoy the passengers of steam-vessels, nor will the massive iron flues be necessary, which, in the event of head winds, impede the progress of the vessel, as the outlet of the flue may be contracted to *one fiftieth* part the usual size, and may be conducted off even under the water.

Having given a sketch of the circumstances which led to the invention of the improved Steam-Engine, Mr. P. proceeds to point out its novelty, construction, economy, and safety. Its novelty consists, first, in generating steam from water confined by mechanical pressure, the water being thereby prevented from boiling; secondly, in condensing the steam without employing more water than is required to supply the generator.

"It is a well-known fact, that water does not boil under atmospheric pressure, until it has been heated to 212°, after which, all the heat that can be applied cannot increase the temperature of the steam or water. Now add an artificial atmosphere, by loading the escape valve (the surface of which is equal to a square inch) with 14lbs., and it will receive 250° of heat with a very little addition of fuel, and the pressure on the square inch will be doubled, or 28lb.; though the mechanical action will not be double, yet it will be increased much more than the consumption of fuel. Let the valve be loaded with two additional atmospheres, or 42lbs., and the temperature will be raised to 280°, and will again produce double pressure, or 56lbs. on the inch, and so on. If the generator be made strong enough (as I have no doubt it may be), to withstand 60,000lbs. load on the escape-valve, the water would not boil, although it would exert an expansive force equal to 56,000lbs.* on the inch, and

be at about 1170 degrees of heat, or cherry red. Water thus heated would, if it were allowed, expand itself into atmospheric steam without receiving any additional heat from what surrounded it. It is not, however, necessary to heat the water to more than about 500 degrees, to have it flash into steam if the generator be properly constructed. I have tried several modifications: the last, (which will be more particularly described), I have found much the best. The first form of generator, although not the best, served to evince the fact which was contemplated, viz. that of heating water in a generator completely filled, and under sufficient pressure to prevent ebullition; and yet as it passed from the generator to the cylinder, to flash into steam, although it had to receive 600 degrees of heat, or thereabouts, in addition to what it already contained, before it became steam.

(To be continued.)

Polytechnic and Scientific Intelligence.

ROYAL SOCIETY.

(Continued from page 218.)

February 19th.—A communication was presented from Sir T. Brisbane, K.C.B. F.R.S. containing a series of observations during his voyage to and residence in New South Wales, relating to Meteorology and Astronomy.

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* It is supposed that 56,000lbs. or thereabouts, to the square inch, is the limit to the power of steam; so that if the generator was strong enough to sustain a pressure of 60,000lbs. it could not be exploded.

A communication by W. H. Woollaston, on the semi-decussation of the optic nerves.

Anatomists have in general considered that the optic nerves in the human eye, meet after passing from the thalami nervorum opticorum, and though still separate, pass on in apparent union, the right eye being supposed to be supplied with these nerves from the left thalamus and *vice versâ*, which is termed the decussation of the optic nerves; although, this idea is apparently supported by the arrangement of those nerves in various fishes, Dr. Woollaston was led to a different conclusion on being affected with a particular species of blindness which he experienced after four or five hours violent exercise; it was first perceived by only one half of a person's face being visible to him, and afterwards by seeing the termination only of the name "Johnson:" the blindness was but partial, and resembled a very strong shade, which affected each eye in the left point of vision, and passed off upwards in an oblique direction in about a quarter of an hour. No similar attack was experienced for several years, when without any apparent cause, both eyes were affected on the right side, which was removed by sudden joy, occasioned by hearing of the safety of a friend for whom he had cause to apprehend danger. A friend of Dr. Woollaston has been liable to the same complaint for seventeen years, whenever his stomach is much disordered; and in one instance it is feared, the blindness is permanent. In this case, a pain was felt at the back of the left eye, and in the left temple; the blindness was on the right side, arising from the passage on the left thalamus nervorum opticorum.

The cases just cited indicate the retina of the eye to be rendered partially insensible, and that the right thalamus supplies the left side of both eyes. The right being supplied by the opposite thalamus, as the nerves supplying the left side decussate, and those on the right do not. Dr.

Woollaston terms this arrangement the "Semi-decussation of the optic nerves."

This theory was then illustrated by some examples from fishes, which supported the Doctor's opinion. He does not consider this species of blindness as a rarity, but not being understood, arises from having escaped observation.

Some remarks on the cause of single vision with two eyes were then introduced, and which were illustrated by the above theory, a pair of filaments from each nerve supply every point in both eyes, thus causing a universal sympathy; hence, one object only is seen by both eyes, and infants instead of squinting move both eyes towards the same object. These observations concluded this highly curious and interesting paper.

February 26th.—A catalogue of the principal fixed stars between the zenith of Cape Town, and the South Pole, was presented from the Rev. Fearon Fallows, F. R. S. Astronomer at the Cape of Good Hope.

A communication from John Barrow, Esq. F.R.S. Secretary to the Admiralty was read, "On the various degrees of intensity of the local magnetic attraction in various parts of ships.

March 4th.—Wm. Wavell, M.D. Captain Philip Parker King, R.N., the Lord Bishop of Limerick, and the Rev. Dr. E. Maltby, were admitted as fellows.

A letter from Sir Everard Home, Bart. V.P. R.S. to the President was read, entitled "some curious Facts respecting the Walruss and Seal discovered in the Examination of the Specimens brought home by the late Expeditions from the Polar Circle." Sir E. H. was anxious to lay these facts before the Society, as these expeditions had been projected by the President and Council. The officers would likewise be informed, that besides the principal object of

their voyage, their exertions might be of great utility to science in general, and that the brine in which the salt provisions are preserved, is well adapted for keeping Anatomical specimens in much better state for dissection, injection, &c. than spirits.

The first discovery was, that the walruss is provided with means similar to those of the fly, which enable it to walk in an inverted position—the structure of the foot of the fly is described in the Philosophical Transactions for 1816, and on seeing a mutilated foot of the walruss, Sir Everard was struck with the resemblances between them, and requested Captain Sabine to bring him a specimen, which with the aid of the assistant-surgeon of his ship he accomplished; on examination, the hind foot was found provided with a hollow space, which enabled the animal to produce a vacuum when it was placed on any surface; the foot was found provided with two toes, which enables the creature to form a more perfect vacuum, by bringing the parts in closer contact with the surface on which the foot is placed, and which also admit the air on their being raised:—in describing the foot of the fly, similar points or toes were observed, but it was not until an opportunity occurred of examining the same organs in a larger creature, that their use was fully developed—the foot of the walruss required diminishing fourt imes to exhibit its parts in a 4to plate, whereas that of the fly required magnifying one hundred times to render it distinctly visible; the drawings of both subjects were made by Mr. Baure.

The second fact relates to the internal formation of the same animal: a reservoir of a cylindrical form, the coats of which are covered with a strong mucus, receives the bile by a lateral communication, and it then propels it into the duodenum; from the width of the œsophagus

large masses of food can be swallowed; the animal possesses the power of regurgitation; the opening of the pylorus is comparatively small and is valvular, by which its contents are prevented from repressing into the duodenum; those parts, and many of the external organs are of a similar structure to those of the seal. Mr. Foster states the food of the walrus to be the fucus digitatus which is found in the Arctic shores and also under the ice. The third subject of remark, was the feenis and placenta of the seal: the vessels of which the feenis is composed, are about nine inches long, and are not twisted, and they anastomose into blood vessels, about three inches distance from the placenta, which is connected with them by three membranous coats; the confirmation admits of great freedom in the fœtal circulation. Drawings illustrative of the two last-mentioned facts, by Mr. Rose, Pupil of Sir E. H. at Guy's Hospital, were annexed to the paper.

A paper by J. Davey, M.D. F.R.S. on "Some further particulars of a Case of Pneumato Thorax."

SOCIETY OF ARTS.

The subjects which have been submitted to the several Committees of this Society during the last two months, are respectively as follows:—

Committee of Mechanics.

An improvement in the mode of working ship's cannon, obviating in some degree the danger attending that operation; a heel-strap for top-masts, to prevent the mast being injured by the Fid; a screw-wrench, the head of which is a ratchet-wheel and is driven by a click attached to the handle, by which means the nut or screw is driven by a conti-

nued alternating motion, without removing the wrench from the nut; several models of safe coaches, all on the principle of throwing out a prop from the side of the coach when in the act of overturning; a method of producing an original screw, by coiling a piece of wire round a cylinder; another in which the thread is produced by the indentations of a succession of knife-edges; another depending on the more careful use of the ordinary dies, which are set in a sliding frame; a segmental pump for deep wells; an improved carpenter's cramp; a family mill very similar to an ordinary coffee-mill; a mode of copying screws; a remontoire escapement; a proposal for propelling steam-vessels by endless chains of paddles; a lamp-boiler; a crane worked by treadles; another by an ordinary tread-wheel; an apparatus for the prevention of accidents in the shafts of mines; a steering-wheel, to effect a more rapid action of the rudder, by the introduction of cogged wheels; a steam-valve; a method of supporting a top-mast without a Fid, in which the heel of the top-mast is received into a kind of step near the top, and is retained in its place by a wedge which is dropped in behind it; a screw-wrench; a printer's index to be attached to the press, for the purpose of shewing the number of sheets which have been printed; an improvement in the steam apparatus for culinary purposes; truss girder.

Committee of Polite Arts.

A method of preventing the erasure of hand writing by using paper tinted with colours which are infallibly changed by acids; an improvement in the projection of maps; an improvement in etching on steel; a plan for the prevention of forgery; and a variety of claims for the premiums offered for drawings, &c.

Committee of Chemistry.

A pink dye for silk; a mode of preventing the dry-rot; improved crucibles; lightning conductors for ships; on coating the inside of iron tanks with Roman cement to prevent the oxidation of the iron.

Committee of Manufactures.

On several claims for the premiums offered for the manufacture of Bonnets from English grasses; on comparative experiments on the wicks of candles; on organzine silk; on cloth made from cotten wool.

Committee of Colonies and Trade.

On fine wool, the produce of New South Wales; on the American felling-axe.

ASTRONOMICAL SOCIETY,

9th April, 1824.

The following papers were read at this Meeting.

1st. On the elements of the orbit of the Comet of 1823, computed from observations made at the Royal Observatory, Greenwich, by Mr. W. Richardson, assistant to the Astronomer Royal. These elements were computed by Dr. Olbers's method. The paper likewise contained a comparison of his Elements with the Greenwich observations from January 1st, to February 2nd, and in more than half the observations, the results of the elements did not differ from them so much as 2′ in longitude or so much as 1′ in latitude.

2nd. On the corrections requisite for the triangles, which occur in geodesic operations; by Captain Geo. Everest, of Bengal, conductor of the Trigonometrical survey in India. This paper contained the solution of two Problems by formulæ employed in India since 1819, and which the author thinks preferable to those given by M.

Delambre for the same purpose. They require the use merely of pocket Logarithmic tables with four places of decimals, of which copious examples were given, and the paper concluded by the application of these formulæ to the correction of angles actually observed in the operations in India.

3rd. On the method of determining the difference of meridians by the culmination of the Moon; by Francis Baily, Esq. F. R. S. Vice President, Astronomical Society.

This paper was of considerable length, and its reading was not concluded.—We shall therefore reserve our remarks upon its contents until our next report.

Several very valuable Books were presented to the Society.

[ERRATA.—Page 218, lines 7 and 16 from bottom, for Sebumacker read Schumaeker, also line 7 from bottom, for Binkley, read Brinkley, page 219, line 14 from top, for Nicrometer read Micrometer.]

Abstract of the First Report, made by a SELECT COMMITTEE *of the* HOUSE OF COMMONS, *respecting the effects of existing Laws relative to Artizans leaving the Kingdom and residing abroad; also on the State and Consequences of the Laws prohibiting the exportation of Machinery; and on the Laws which apply to combinations of Workmen to regulate the Prices of Labour, being Minutes of Evidence taken 17th February;* 1824.

Joseph Hume, Esq. in the Chair.

Mr. John Martineau. Is an engineer—has frequently received orders for tools and machines from abroad, has refused to execute such machines as are prohibited by Act of Parliament, because it would have been necessary to have entered them at the Custom House under false descriptions, in order to deceive the officers—could have exported prohibited machinery in detached pieces

at different times, without the possibility of detection; has done less business in consequence of the prohibitory laws—has no doubt other engineers are every day placed under similar circumstances.—Is of opinion that any prohibited machinery might be exported by management, particularly if parts of several machines were mixed together, and sent abroad at different times, by which the officers of the Customs would be deceived, and even engineers themselves would be unable to discover the nature of the machine to which the parts belonged.

All the materials, of which machines are constructed, are the production of our own mines, and the labour of our own people. The amount of labour on machinery, generally speaking, forms a very large portion of the value of a machine, even where the manufacturer receives the materials in the shape of pig or bar iron; but if the labour bestowed on the pig or bar iron, in the first instance, be taken into the account, it may be almost entirely considered as labour. Many orders for machinery have been offered to deponent, but refused in consequence of the prohibitory laws, which orders, if not abandoned, have been executed abroad, or by persons at home less scrupulous. Parts of machines, as the castings, have often been made in this country in such a shape that the Officers of Customs could not discover their object, and artizans sent from here to finish them in France.

Many manufactories have lately been established, particularly in France, for making machines and tools of different descriptions, and among others, those machines which the existing laws forbid us to export; these manufactories are almost entirely conducted by Englishmen. The three principal manufactories at Paris are so; the works at Charenton are under the direction of Mr. Manby; those at Chaillot by Mr. Edwards, and another is conducted by Mr. Steele.

If the laws remain unrepealed, foreign nations in Europe and America will soon furnish themselves with such machinery and tools as we are prohibited from exporting. One of the principal motives for establishing those manufactories undoubtedly has been the difficulty of procuring tools and machinery from England; there is, however, another reason, (viz.) the protecting duties which the French have put upon articles imported into that country.

The duty on Steam-Engines at present is *an ad valorem* duty of thirty per cent.; it was formerly fifteen per cent.; but has been advanced in order to protect the new manufactories at Paris; other machinery pays fifteen per cent. The increased duty, however, does not prevent British Steam-Engines from being sent there; the superiority of the British Steam-Engines, and the prices, are more than equivalent to the additional duty, including the freight. Foreigners cannot manufacture machinery in general so cheap, or so good, as we can; their labour is at least 25 to 30 per cent. higher than here, arising from their generally employing English workmen; the raw material is, at least, ten per cent. dearer than in this country, that is iron: the brass forms but a small part of the value of most machines, and timber is altogether a very inconsiderable matter. A French smith, upon an average, receives about four francs per day; while an expert English smith would, in Paris, obtain ten or eleven francs per day, both being of the same class of workmen; the difference does not arise entirely in the superiority of the work, but in the quantity manufactured in a given time.

There is a very great capital necessary to establish a manufactory of machinery in either country, and if our prohibiting laws were abolished, a considerably augmented capital would be employed here provided the importation duties in foreign countries remained as they now

are. It appears to be the interest of foreign countries to take off those import duties. There is no doubt that if the trade was free, English Engineers would supply the greater part of the world with tools and machinery, England possessing such great natural advantages from the circumstance of the iron stone and coal being invariably found in the same spot, affords the means of manufacturing iron at a cheaper rate; the talent and ingenuity of the workmen; the immense spare capital of the country; and the canals and rail roads already established, enabling us to bring the raw material from the interior at a cheaper rate; advantages which no other country possesses, and which it would require many years to effect.

(To be continued in our next.)

New Patents Sealed, 1824.

To Charles Demeny, of Paris, in the Kingdom of France, but now residing in Fenchurch Street, in the City of London, Merchant, in consequence of a communication made to him by a certain Foreigner residing abroad, with whom he is connected, for an invention of an Apparatus containing within itself the means of producing Gas from Oil, and other Oleaginous Substances; of burning such Gas for the purpose of affording Light, and replacing the Gas consumed.—Sealed 22d March. Two months for inrollment.

To Namen Goodsell, late of the State of New York, in the United States of America, but now of Leigh Street, Burton Cresent, in the County of Middlesex, Engineer, for his invention of a certain Machine, or Piece of Machinery, for breaking, scutching, and preparing Flax and Hemp, for use, upon an improved method, and threshing out the Seed thereof, and which is applicable to the threshing of any other kind of Grain; and also

for shelling Clover and other Seeds.—Sealed, 25th March. Six months for inrollment.

To Edward Jordan, of the City of Norwich, Engineer, for his invention and discovery of a certain improvement or improvements in the form or construction of Water-Closets, or of the Apparatus connected therewith. Sealed, 27th March. Six months for enrolment.

To Joseph Spencer, of Belper, in the County of Derby, Nail Manufacturer, for his invention of certain improvements in the construction of Furnaces and Forges for the preparation of Iron or Steel, and for the process of Manufacturing Nails and other Articles from the said Materials.—Sealed, 7th April. Six months for enrolment.

To Jonathan Schofield, of Rastrick, in the Parish of Halifax, in the County of York, Manufacturer, for his invention of certain improvements in the Manufacture of Cloth or Fabrick, which he denominates British Cashmere.—Sealed, 7th April. Six months for enrolment.

To Thomas Ryalls, of Sheffield, in the County of York, Warehouseman, for his invention of an Apparatus for Shaving, which he denominates the Useful and Elegant Facilitator.—Sealed, 8th April. Two months for enrolment.

ToSamuel Hall, of Basford, in the County of Nottingham, Cotton Manufacturer, for his invention of an improved Steam Engine.—Sealed, 8th April. Six months for enrolments.

To James Tulloch, of Savage Gardens, in the City of London, Gent. for his invention and discovery of an improvement orimprovements in the Machinery to be employed for sawing and grooving Marble and other Stone, or in producing Grooves or Mouldings thereon.—Sealed 12th April. Six months for enrolment.

To Henry Potter Burt of the Borough of Devizes, in

the County of Wilts, Ironmonger, for his invention of an improvement in the coustruction of Cranks, such as are used for Bells and other purposes.—Sealed, 14th April. Six months for enrolment.

To William By, of Joy Cottage, Ivory Place, Brighton, in the County of Sussex, Stationer and Bookseller, for his invention of a method or apparatus for the preservation or protection of Books and Covers. Sealed 14th April. Six months for enrolment.

To John Gunby, of New Kent Road, in the County of Surrey, Sword and Gun Manufacturer, for his invention of an improvement in the process of Manufacturing of Cases for Knives, Scissors, and other articles.—Sealed, 14th April. Six months for enrolment.

To David Gordon, of Basinghall Street, in the City of London, Esq. for his invention of certain improvements in the construction of Portable Gas Lamps.—14th April. S ix months for enrolment.

To John Burn, of Manchester, in the County Palatine of Lancaster, Dealer in Cotton Twist and Weft, General Commission Agent for Manufactured Goods, for his invention of a New Apparatus for dressing various kinds of Cotton, Flaxen, Woollen, or Silk Manufactures. —Sealed, 14th April. Six months for enrolment.

To Thomas Gettien, of Henry Street, Pentonville, in the County of Middlesex, Gent. for his new invented improvements in the Machinery and Process of making Metallic Rollers, Pipes, Cylinders, and certain other articles.—Sealed, 15th April. Six months for enrolment.

To Daniel Tonge, of Liverpool, in the County Palatine of Lancaster, Ship Owner, for his new invented apparatus, by means of which an improved method of Reefing Sails is effected.—Sealed, 15th April. Six months for enrolment.

D.	H.	M.	S.	
1	0	0	0	☉ declination 15° 8′ 49″ N.
1	2	3	0	☽ passes the meridian.
1	3	57	0	♃ passes the meridian declination 23° 26′ N.
1	21	0	0	☿ in conj. with A in Taurus.
1	22	32	0	♀ Passes the merid. dec. 5° 17′ N.
2	23	0	0	☽ in conj. with ♃ long. 7° 17′ in Cancer ☽ lat. 26′ N. ♃ lat. 10′ N. dif. lat. 16′
3	14	0	0	☽ in conj. with ♁ in Gemini.
5	0	0	0	♂ Stationary.
5	16	15	0	☽ in □ first quarter.
5	22	0	0	☽ in conj. with ξ in Leo.
6	0	0	0	☉ Dec. 16° 36′ 5″ N.
6	3	0	0	☽ in conj. with ο in Leo.
6	6	46	0	☽ Passes the meridian.
6	10	26	13	♃'s 2nd sat. will emerge.
6	11	0	0	☽ in conj. with π in Leo.
7	16	0	0	♀ in conj. with ο in Pisces
11	0	0	0	☉ dec. 17° 56′ 20″ N.
11	10	56	0	☽ passes the meridian.
12	14	34	0	Ecliptic opposition ☉ Full moon.
13	3	26	0	♃ Passes the merid. dec. 23° 19′ N.
13	14	0	0	☾ in conj. with σ in Scorp.
13	22	41	0	♀ passes the merid dec. 10° 44′ N.
14	16	0	0	☾ in conj. with ϑ Oph.
14	18	0	0	☾ in conj. with B. Oph.
16	0	0	0	☉ declin. 19° 9′ 18″ N.
16	8	0	0	☾ in conj. with 1 ν in Sag.
16	13	0	0	☾ in conj. with ο in Sag.
16	15	23	0	☾ passes the meridian.
16	16	0	0	☾ in conj. with π in Sag.
16	19	0	0	☾ in conj. with ♅ long. 15° 21′ in Capri. ☾ lat. 28′ N. ♅ lat. 24′ s. diff. lat. 52′
20	12	37	0	☾ in □ last quarter.
20	16	26	0	☉ enters Gemini.
21	0	0	0	☉ declin 20° 14′ 6″ N.
21	19	2	0	☾ passes the meridian.
22	0	0	0	☿ Stationary.
24	23	0	0	☾ in conj. with η in Pisces
25	22	50	0	♀ passes the merid. dec. 15° 37′ N.
26	0	0	0	☉ declin. 21° 10′ 19″ N.
26	22	54	0	☾ passes the meridian.
27	9	18	51	♃'s 3rd sat. will immerge.
28	3	3	0	Ecliptic Conjunction ● New Moon.
30	15	0	0	☽ in conj. with ♃ long. 12° 39″ in Cancer ☽ lat. 16′s ♃ lat. 12′ N. diff. lat. 28′
30	21	0	0	☽ in conj. with ♁ in Gemini.
31	0	0	0	☉ dec. 21° 57′ 26′ N.
31	2	51	0	☽ passes the meridian.

Rotherhithe. J. LEWTHWAITE.

The waxing moon ☽—the waning moon ☾.

ERRATA FOR APRIL.

	D.	H.	M.	S.			D.	H.	M.	S.	
For	4	0	0	0	♀ in conj. with θ in Aqua.	*read*	4	4	0	0	♀ in conj. with Φ in Aqua.
	7	8	34	0		*read*	7	8	34	17	
	8	8	4	26	♃'s 4th Sat. will emerge	*read*	immerge.				
	20	18	0	0		*read*	20	18	10	0	

METEOROLOGICAL JOURNAL, MAR. AND APRIL 1824.

1824.	Thermo. Higt.	Low.	Barometer. +	−	Rain in inches.	1824.	Thermo. Higt.	Low	Barometer. +	−	Rain in inches.
MAR.						APRIL					
26	46	37	29,92	29,85	..	10	42	34	29,39	29,34	,1
27	45	34	,77	—,68	..	11	41	29	,31	stat.	,175
28	42	30	,83	—,76	..	12	47	28	,47	29,31	..
29	45	26	,89	—,83	..	13	50	28	,71	—,54	..
30	52	35	,66	—,59	..	14	53	28	,79	—,77	..
31	39	29	,77	—,59	..	15	54	28	,76	—,64	..
APRIL						16	44	37	,32	—,26	..
1	46	26	,81	—,65	..	17	46	30	,67	—,36	,425
2	45	33	,69	—,05	,2	18	53	34	30,09	—,88	,2
3	48	29	,96	—,89	,35	19	57	29	,17	30,15	..
4	51	40	30,23	30, 1	..	20	75	32	,24	—,21	..
5	50	28	,35	—,32	..	21	60	32	,07	29,86	..
6	49	34	,35	—,34	..	22	62	48	29,86	—,79	..
7	48	35	,14	—,04	..	23	51	44	,55	—,18	..
8	51	33	,16	—,12	..	24	58	44	30,02	—,86	..
9	51	33	29,99	29,84	..	25	62	37	,07	—,98	..

CHARLES ADAMS, LOWER EDMONTON.

LITERARY NOTICES.

A New History of Animals, classed according to their organization, has been published at Paris, by the celebrated Cuvier. This work being of the first order of merit and of standard authority in this branch of Natural History, an English Translation has been undertaken by E. Griffiths, Esq. F. L. S. and will be published in Parts, illustrated with Engravings. It is expected that the work will be completed in about five years, making 10 quarto volumes.

Mr. Charles Dupin, Member of the Institute of France, &c. &c. &c. expects in the course of the present month to complete his work on the Commercial Power of Great Britain, 2 vols, 8vo. embellished with fifteen quarto Plates. It will comprise a complete View of the Public Works of this Country, under the several Heads of Streets, Roads, Canals, Aqueducts, Bridges, Coasts, Maritime Ports, &c.

A New Literary Journal is announced to appear this month, to be called the "Revue Européenne ou productions de l'esprit humain en France, en Angleterre, en Italie, en Allemagne." The publication will be monthly. It proposes to give information of all the new works published, of discoveries made, progress ascertained, &c. in the Arts and Sciences in every country of Europe; and is to be published in English at London, in French at Paris, Italian in Italy, German in Germany, &c.

An Appendix in Quarto, to Captain Parry's Second Voyage, containing the Natural History, will be published in a short time.

Captain Lyon of the late Polar Expedition has announced his intention of Publishing his private Journal of that Voyage speedily.

The publication of the voyage round the World, performed by command of the French Government in the corvettes Uranie and Physicienne, during the Years, 1817-18-19 and 20, by M. Louis de Freycinet is ordered by the Minister of the Interior, it will form 8 quarto vols, with 4 Attasses of 348 Plates, of which 117 will be coloured.

A History of the Regeneration of Greece, comprising a Sketch of the Events from 1740 to 1824. By Mons. F. C. H. L. Pouqueville, Author of Travels in Greece, is nearly ready for publication; it will be in 4 vols, 8vo. with 5 maps and 7 portraits: considerable expectations are formed of this work from the celebrity the author attained by his former production.

A New Library and Literary Institution is in agitation to be formed near the centre of the City of London. It is to consist of books in the English language only, and to be a library both of reference and circulation. The Arts and Sciences are proposed to be encouraged and cultivated by the delivery of lectures and experiments, and also by proposing prize questions.

The Institution is intended to be formed by a number of Persons as Shareholders and Proprietors not exceeding 200, who may be admitted either by paying the price of their Share, (15l.) or by the presentation of 50 volumes, if equal in value to the amount of a Share.

It is also purposed to defray the expenses of the Institution and the purchasing of new works, by Subscribers to the library, and to admit all Subscribers and Proprietors to the Lectures of the Institution.

Messrs. Boswell and Co. of Aldermanbury, are said to have made some valuable improvements in Canvas for the sails of ships, by a process that prevents mildew, which is so extremely destructive in tropical climates. This invention, when applied to canvas made of the best material, is said to impart heretofore undiscovered valuable qualities, the sails are more pliable, and not subject to cut out by friction, to endure longer, and to increase the velocity of sailing from the closeness and flexibility of its texture. The invention, it is said, has met the approval of the Commanders and Officers in the Navy, but we have not yet learned its principle, and have some suspicion that it is only the practical introduction of one of those plans for rendering fabrics waterproof, which has been the subject of a patent of some time standing.

LONDON:
SHACKELL AND ARROWSMITH, JOHNSON'S-COURT, FLEET-STREET.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLII.

Recent Patents.

To THOMAS MILES, *of Dudbridge, near Stroud, in the County of Gloucester, Cloth-Dresser, for Communications made to him by certain Foreigners, residing abroad, of certain Improvements on Machines for Shearing or Cropping Woollen-Cloths.*

[Sealed 3d June, 1823.]

IT is stated by the patentee, that this modification of machinery, for shearing or cropping woollen and other cloths, has been extensively employed in the United States of America with great success for some years past; but that it is now, for the first time, introduced into England. He considers, that its simplicity of construction, and efficacy of operation, render it superior to any of the shearing machines hitherto employed in this country.

Plate XV. Fig. 1, is a perspective representation of the machine; *a*, *a*, *a*, is the fixed frame work of iron, which supports the moveable parts; *b*, *b*, *b*, is the sliding frame, also of iron, carrying the cloth under the cutters to be shorn; *c*, is a driver or rigger, which being actuated by any first mover, puts the machine in operation. At the end of the axle of the driver *c*, a pulley *d*, is fixed; from whence a cord or band extends to a wheel *e*, shewn by dots: to this wheel a pulley is attached, which by means of a band passing from it, turns the wheel *f*. The reverse end of the axle of this wheel *f*, carries a pinion *g*, which takes into the rack of the sliding frame *b*, and thus by the revolution of the rigger *c*, and the bands and wheels connected to it, the frame *b*, is made to travel upon its rollers, which run in the grooves at bottom of the fixed frame.

The cloth, intended to be shorn, is first to be rolled upon the shaft *h*, *h*, and when that is placed in the frame, the cloth is passed over to the other side, as is seen in the figure, and attached to the receiving roller, *i*; these rollers, being prevented from turning back by ratchets and palls. The cloth is stretched and held fast, breadth ways by hooks, attached to end rails *k*, which take hold of the lists.

The cutter is a cylinder *l*, with a twisted blade, working against a straight edge beneath it, as a ledger blade. This cylinder does not revolve, but vibrates by means of a small crank-rod *m*, connected to it and to the pulley-wheel *n*, which is actuated by a band from the rigger *c*. The frame carrying this cutter turns up on pivots, and may be raised, or lowered, by the handle *o*. The side of this part of the machine is shewn detached at Fig. 2.

When the machine is not in operation, the cutter *l*, will be held in its position, raised off the cloth, as in Fig. 2,

by the weight *p*, and at the same time the pinion *g*, will be drawn up out of the rack, by the rod *q*, (the axle of the pinion at this end resting in the small lever *r*); but, when the machine is put in action, the cutter *l*, is brought down upon the cloth, as at Fig. 1, and held there by a pin, near the handle, stopping against a spring catch *s*; at the same time the pinion *g*, is thrown into gear with the rack *b*.

The bed, against which the cutter is to act, is a solid cylinder *t*, *t*, turning upon pivots, as shewn by dots, supported upon a fixed frame *j*, *j*, connected to the standard. Over this the cloth passes, and immediately upon the top of the cylinder, the ledger-blade, and cutter, is intended to press when in action.

The construction of the machine being now described, its operation will be clearly understood by the following explanation. Draw out the sliding frame *b*, *b*, to the extremity of the bottom rails *a*, *a*, then pass the cloth from the roller *h*, to the roller *i*, and stretch it tight; the cylinder *t*, bearing it up. Now the cutter *l*, must be brought down, as in Fig. 1, by which means the cloth will be pressed between the cylindrical bed *t*, and the cutter *l*, and the whole will be ready for action. The moving power being now applied to the driver *c*, the axle and pulley *d*, will turn, from whence the bands, or cords, passing to the wheels *e*, and *f*, cause the axle and pinion *g*, to revolve in the rack *b*, *b*, and by that means to drive the carriage *g*, with the cloth forward; at the same time a cord from the driver *c*, turns the pulley-wheel *n*, and that, by means of the crank-rod *m*, causes the cutter *l*, to perform a very rapid vibratory action; which cutter working against a fixed ledger-blade, (that raises the pile, as the cloth passes under it) by its vibratory action cuts or crops the pile exactly in the same manner as a pair of

ordinary hand shears, or as the shearing frames commonly employed.

When the entire breadth of the cloth has completely passed under the cutter, a bolt *v*, at the end of the travelling frame, comes in contact with the spring catch *s*, and by pushing it back, liberates the pin: when the cutting frame is raised off the cloth, by the weight *p*. One portion of the cloth having been thus operated upon, the hooks are to be removed from the lists, and the roller *i*, turned, for the purpose of bringing another portion of the cloth under the cutter; when the operation above described is to be repeated, and so on until the whole length of the piece of cloth is completely shorn.

The patentee concludes by saying, "My improved machine for shearing or cropping woollen cloth consists in the general modification and combination of its parts, arranged, and specified, in the foregoing description, and annexed drawings, and not for any of the abstract parts of which it is composed; nor do I confine myself to the precise minutiæ of the parts, or to the way there laid down, and here explained in the minor arrangement of my improved shearing machine, but to the general, important, and substantial parts of its modification, and combination, in reference to the whole, and to each of the respective branches of the machine, as herein described, and by which I attain a simple, economical, and effective machine, for the purpose of shearing and cropping of woollen cloths."

[*Inrolled December*, 1823.]

To THOMAS ATTWOOD, *of Birmingham, in the County of Warwick, Banker, for a Communication made to him by a Person, residing abroad, of certain Improvements in the making of Cylinders, for the Printing of Cottons, Calicos, and other Articles.*

[Sealed 9th June, 1823.]

THE improvement, herein proposed, is to solder a cylinder of copper, or other metal, or alloys of metal, upon a cylinder of iron; which is to be done by any of the usual modes of soldering metals together Cylinders may be thus produced, with surfaces suited for engraving devices upon, for printing calicos, &c.: the surface only being of copper, while the internal part of the cylinder is composed of a cheaper and stronger material.

This contrivance allows of the subject, on the face of the copper, being removed, by turning and polishing, without reducing the cylinders so as to effect their strength, and even permits the whole of the copper to be taken off, and new copper attached to the same iron cylinders, at a trifling expence, compared to the entire cost of new copper cylinders.

[*Inrolled, November,* 1823.]

To WILLIAM GOSSAGE, *of Leamington Priors, Warwickshire, Chemist and Druggist, for a Portable Alarm, to be attached to, and detached from, Clocks and Watches; and which may be regulated to take effect at any given Period of Time.*

[Sealed 11th February, 1823.]

THIS invention is a small train of wheel-work, with an alarm bell, enclosed within a box; on the top of

which a watch being placed, and connected to a part of the train, causes a wheel belonging to the alarm to revolve with the going of the watch, until having arrived at a certain point, previously determined, by adjusting the dial, a pall suddenly falls into a recess, and permits the alarm to go off.

Plate XV. Fig. 3, represents what may be considered as a horizontal section of the box and the bell, (the cover or pillar plate being removed, for the purpose of shewing the operation of the train of wheels within;) *a*, *a*, *a*, is the outer rim of the box, (about the size and shape of a circular snuff-box,) the rim being perforated with ornamental openings, for the purpose of permitting the sound to pass more freely; *b*, *b*, *b*, is the rim of the bell shewn in section. Within this bell the whole of the mechanism is placed, as seen in the figure; *c*, is a spring-barrel, on the top edge of which is a rim of teeth, taking into a pinion *d*; on the arbour of *d*, there is also a toothed-wheel *e*, taking into a pinion *f*, and on the arbour of *f*, another toothed-wheel *g*, taking into a pinion *h*. At the upper part of the arbour of *h*, the flyer *i*, is attached, and by its resting against the pall-lever *k*, the action of the train is stopped.

The wheels *l*, and *m*, are not connected to the train, they are loose; the upper end of the arbour of the small wheel *l*, is extended to the outside of the box, and is made hollow, as the pipe of a watch-key, to receive the winding square of the watch; and by that means the watch is connected to the alarm. The teeth of this small wheel *l*, takes into the teeth of the larger wheel *m*, which carries a circular rim *n*, having a notch or opening in its periphery. Against this circular rim one end of the pall lever *k*, is pressed by a spring, and when the going of the watch has brought this wheel *m*, into such a position as to permit the end of the pall-lever *k*, to drop into the

notch, or opening, the other end of this lever recedes, and liberates the train of wheels, which are immediately put in action by the power of the spring barrel.

The teeth of the rim *c*, upon the spring-barrel, also take into a pinion *o*, and cause it to revolve when the train is going. On the top of the arbour of *o*, a circular plate *p*, is fixed, and in this plate are set a series of pins, standing up, and as the plate revolves, striking against the tail of the hammer *q*.

To adjust this alarm, so as to go off at any required hour, the following means is to be resorted to. On the top of the arbour that carries the wheel *m*, a dial plate is fixed, as shewn detached at Fig. 4, the face of which is partly seen on the outside of the box. This dial plate is readily moved round by means of a watch-key, and with it the wheels *m* and *l*, turn as before-said. If then it is required, that the alarm shall go off at six, seven, eight, or any other number of hours after the time of setting, the dial plate must be put so many hours back, which is denoted by an index; the watch is then to be placed upon the alarm, and connected to it, as before described, by inserting the winding square of the watch into the pipe of the wheel *l*; the going of the watch now causes the wheel *l*, to revolve, which drives the wheel *m*, and when the notch of the circle *n*, has arrived at the point of the pall *k*, (which it will do at the appointed time) then the end of the pall drops into the notch; and its reverse end receding liberates the fly *i*, and allows the train to go off. The wheel *c*, at this time, turns the arbour *o*, with the plate *p*; when the pins of the plate striking against the tail of the hammer *q*, moves it back, and causes the hammer to vibrate, and give a series of sharp blows upon the side of the alarm bell *b*, which striking continues until the spring barrel has run down.

Such a piece of mechanism is applicable for an alarm to clocks also; but some of the parts must be altered, and the whole made upon a larger scale, which the patentee contemplates, but does not consider as capable of very convenient adaptation.

[*Inrolled, April,* 1823.]

To ROBERT ROGERS, *late of New Hampshire, in the United States of America, but now of Liverpool, in the County of Lancaster, Master Mariner, and Ship Owner, for his Invention of an improved Lanyard, for the Shrouds, and other Rigging of Ships, and other Vessels; and an Apparatus for setting up the same.*

[Sealed 18th August, 1823.]

THIS improved lanyard is a substitute for the usual blocks, lanyards, or dead-eyes, employed in rigging ships. It consists of an iron frame, as seen in Plate XV. Fig. 5: *a, a*, are the parallel sides of the frame, forming a loop at top, and united at bottom to a socket. Through this socket the rod *b*, passes, which has an eye at its lower extremity, receiving the link of the shackle *c*, and the rod itself is perforated with several holes, for the fore-lock or bolt *d*, to pass through, to fix it, when the rigging is drawn tight; *e*, is a ring, which may be placed under the fore-lock, in order to adjust the length.

The upper part of the frame holds the end of one of the shrouds, which being passed through it, and round the thimble, is made secure by lashes. Through the eye, at the lower end of the rod, the link passes, to which the shackle affixed to the side of the ship is connected, as before said. By these means the parts are put together, and thus a substitute for a lanyard is constructed.

The other part of this invention is a portable apparatus for setting up the shrouds and other rigging, and is intended to be employed for drawing together the parts of the substitute for the lanyards, above described, previous to their being secured by the forelock. One of these implements is shewn in use at Fig. 5. At the top there is a hook *g*, intended to catch into the thimble: to this hook is attached the screw *h*, by means of the swivel *i*, at its head; this screw works in a box *k*, which turns upon swivels in the long hook *l*; the form of the swivels and the hooks are shewn in the side view of Fig. 6.

The top hook *g*, being introduced into the thimble, and the bottom hook *l*, into the link *c*, the parts are drawn together by means of a small lever or wrench, placed in the top of the screw *h*, as at *m*, Fig. 6, by which means the screw is made to turn round in the box *k*, and drawn up the long hook *l*, so as to tighten the shrouds, and enable the forelock to be passed through one of the holes of the rod *b*, and thereby to fasten the apparatus as before explained.

The patentee does not mean to confine himself to this particular form of the apparatus; but intends to avail himself of any other form by which the effect of drawing together the parts of the substitute for lanyards can be produced; neither does he intend to claim the invention of any of the different parts composing the apparatus, but only that general application to the purpose of constructing a portable apparatus, by which any of the shrouds, or other rigging of ships can be set up in combination with his substitute for the lanyard.

[*Inrolled, October,* 1823.]

To JOHN DAY, *of Barnstaple, in the County of Devon, Esquire, for his Invention of certain Improvements on Percussion Gun-Locks, applicable to various descriptions of Fire-Arms.*

[Sealed 13th November, 1823.]

THIS invention is a new method of constructing the lock of a percussion-gun, so as to render it more compact and convenient for firing, than any other gun-lock that has hitherto been contrived, to fire upon the detonating principle. The patentee has adapted his invention to a walking-stick-gun; a section of which is shewn in Plate XV. Fig. 7, (the parts being as situate before cocking); *a*, is the barrel, upon the patent breech principle, with a nipple *b*, to receive a detonating copper cap; *c*, is the cock or lever; *d*, the trigger; *e*, the sear-spring; *f*, the main spring; *g*, the swivel or bridle.

Fig. 8, shews the same construction of lock; the parts corresponding to the above, being referred to by similar letters. In this figure the piece is cocked, and the finger being pressed against the trigger *d*, discharges it: when the end of the cock *c*, falls upon the copper cap, and by its percussion explodes it.—*h*, is a hole to pass the string or strap through, which is commonly attached to a walking-stick. This hole also permits the fumes of the detonation to pass off instead of penetrating to the lock-chamber, which would tend to rust or corrode the works. This is further prevented by a small partition plate *i*. The end of the stick has a buck-horn handle; but a wooden stock may be substituted as in ordinary guns.

Fig. 9, is another modification of the same plan, the situation of the main spring being reversed; the spring is, in this contrivance, pulled in the act of cocking, instead of being pushed as in the former case. Fig. 10, shews a

third method of constructing a similar kind of lock. In this manner the lock movement may be adopted to a common fowling-piece, or other gun, by affixing the box or case containing the movements in a recess, in the under part of the stock.

The advantages proposed by this construction, are that this lock consists of fewer parts than other locks in general use, consequently is less expensive, and less likely to get out of order, more easily cleaned from the effects of the explosive powder, and is capable of being made more completely water proof than when situated where other kinds of gun-locks are usually placed.

[*Inrolled, January,* 1824.]

To WILLIAM GREAVES, *of Sheffield, in the County of York, Merchant, for certain Improvements on, or additions to Harness, principally applicable to Carriages drawn by one Horse.*

[Sealed 28th February, 1824.]

THE objects contemplated by the patentee, are to obtain an increased command over the horse in driving, and to prevent his rearing or kicking. Plate XVI. Fig. 2, exhibits a pair of haimes, to be attached to the horse's collar. On the side of the haimes there are arms *a, a,* with eyes through which the reins are to pass, and by that means they are kept from the horse's neck, and greater command is obtained in managing him. Fig. 3, is the saddle with a bar *b*, having similar eyes at its extremities: Fig. 4, is also a saddle, with another contrivance, *c, c,* being arms with eyes; these three plans having the same object, viz. to give increased power to the driver.

The mode by which the horse is proposed to be prevented from rearing or kicking is by means (as shewn in Fig. 5,) of an improved rein fastened to the bit, or nose-strap *f*, passing through a ring or loop *g*, over the horse's head, also passing through a ring or loop *h*, on the saddle, and secured to a hook *i*, by a ring or loop fastened to the splash board *k*.

The advantages proposed to be derived from this contrivance, are stated in the following words;—" should the horse prove restive, or attempt to rear, or kick, I immediately pull the rein, whereby his head is raised, which prevents him when playful or restive, from doing mischief." We do not exactly see this invention in the light that the patentee places it, but the advantage of the following is still less evident. " Fig. 6, is a box that the axle of the wheel is to run in, which may be applied to the axle-tree of a water-wheel to give an *increase of power*. Any convenient shape may be employed.

" Under this patent, I claim, as new, the projecting arms, and the rod, or any other method of keeping the reins at any covenient distance from the horse's neck. I also claim, as my invention, the rein passing over the horse's neck and attached, as above described, to the splash board."

[*Inrolled April*, 1824.]

To William Lister, *of Baildon, in the Parish of Otley, in the County of York, Cotton Spinner, for certain Improvements in the Method and Machinery for preparing and spinning Wool, Silk, Mohair, or other Animal Fibre, of any quality or length of Staple.*

[Sealed 16th January, 1823.]

These improvements appertain both to the process

and to the machinery by which wool may be spun into worsted yarn, without the operation of combing; the same will also apply to silk or mohair. The improved process consists,—first, in passing the wool through water, for the purpose of making its short loose fibres adhere together; secondly, in pressing the sliver between the rolls, by which the water is expressed and the fibres in some degree felted; and thirdly, in calendering the sliver between heated rollers, so as to straighten the filaments of wool, previous to its passing to the roving spindle.

Plate XVI. Fig. 1, shews a section of the machine, in which *a*, *a*, *a*, are three bobbins, having the slivers of wool wound upon them. From these bobbins the slivers descend to the roller *b*, which is immersed in a trough filled with either hot or cold water, and the fibres having become wetted by passing under this roller, the three unite into one thread and adhere together. The sliver now rises to the pressing rollers *c*, *c*, where the water is squeezed out, and the wool made to felt. From hence it proceeds through the series of drawing-rollers *d*, *d*, which are placed and operate in a similar manner to the ordinary drawing apparatus, where the several pairs of rollers are made to revolve, with different degrees of velocity, by means of toothed-wheels upon the ends of their axles, the second pair faster than the first, the third pair faster than the second, by which the filaments of the wool are drawn out, the sliver reduced in substance and elongated.

From the front pair of drawing-rollers the sliver proceeds between the calendering-rollers, *e*, *e*, *e*; the lower rollers, being hollow, are intended to be heated, either by steam passing through them, or by any other convenient mode. The fibres of wool by this calendering process become straightened, and the sliver is thence con-

ducted through the eye of the flyer *f*, to the roving spindle.

Motion is given to this machinery from any first mover, as a water-wheel, or steam-engine, by a band passing over the rigger *g*, upon the axle of which is the drum *h*, from whence, by bands, the roving spindles are turned; and also the pulley *i*, from whence a band passes to the wheel *k*, by which the train of toothed-wheels and pinions are actuated, that move the pressing, drawing, and guide-rollers.

[*Inrolled, June,* 1823.]

The advantages of employing heated rollers in the process of roving and spinning wool is already well known: Mr. Hadden, of Aberdeen, obtained a patent for it in 1819; see our first volume, page 172. Passing cotton, flax, and silk through water in the process of roving and spining, has been long practised with similar views to those of the present patentee; but how far that process, as applied to wool, may be new or desirable, we are not exactly aware. EDITOR.

To THOMAS GAWAN, *of Fleet Street, in the City of London, Truss Manufacturer, for his invention of certain Improvements on Trusses.*

[Sealed 11th November, 1823.]

THIS patent is granted for certain improvements upon a previous invention, relative to trusses, for which Mr. Philip Pinder, of Farningham, in the county of Kent, obtained a patent in 1819. Mr. Pinder's invention consisted principally in the manner in which he constructed

the pad of the truss, of which we will endeavour to give a description. Plate XV. Fig. 11, shews a section of the parts of the pad; *a*, is a thin plate of metal, wood, horn, or other stiff substance, forming the outside support; *b*, is a piece of leather fitted to the concave of the plate, and fastened to it by pins or screws; *c*, is a piece of cork about half an inch thick, cut to fit the form of the plate and leather. This cork is hollowed out in the middle, and is coated with silk, leather, or other soft material; *d*, *d*, is a cushion made of silk, or wash leather, and stuffed with fine wool. These parts are brought into close contact by small cords with tufts at their ends, which secure the cushion and the cork to the outer plate, and thus form the compact pad; *e*, is a small central part, intended to be let into the recess of the cushion, and held thereto by a ribbon. This piece *e*, may be made harder or softer than the other parts of the pad, as the circumstances of the patient shall require.

A pad, constructed in this manner, is adapted by the present patentee, whose improvements in "the umbilical or navel and inguinal trusses," consist in "a more efficient way of keeping the same to its situation and bearing, with greater ease and comfort to the wearer." The body belt, and pad belt, for securing the truss, are the same as those commonly employed, but instead of the thigh belts which are usually buckled round the thigh, the present inventor proposes to prevent the pad from rising upwards, by means of an under strap, formed and applied in an improved manner.

Th s contrivance is shewn at Figs. XII. and XIII.—*a*, *a*, are these under straps adapted to pass between the thighs, they are made broad at the hinder part, and divided into two branches, the extremities being attached to the back of the body belt, and after passing under the thigh they

buckle or bottom to the pad plate in front. This strap is rendered as soft and pliant as possible at the under parts, where it presses, and for this purpose the leather which forms the strap, is proposed sometimes to be discontinued at the junction of the divided part, and threads of linen, silk, or other soft fibre substituted in its stead; this is to be covered with flannel, leather, or other soft material, and thereby formed into a soft belt of a round or oval figure. The other end of the thread is to be made fast to the front strap, for the purpose of buckling, as before said; by means of this soft belt, the pad is prevented from shifting its place, without the unpleasant and inconvenient mode of buckling a strap round the thigh, as is usually done.

It is further proposed, in some cases, to confine the truss-pad, by attaching it to a sort of stays, made of linen, flannel, or other suitable material, covered over ribs of whalebone, and suited to the form of the body; which stays are to extend up under the arm pits, and fasten to the body by lacing or otherwise; there is, however, no drawing of this kind of stays given, nor does it appear by what means they are to be prevented from shifting or riding up. It is also proposed to secure the pad and the body belt in their place by a "secondary or under body-belt, which is adapted to encompass the body below the largest or most prominent part of the abomen;" but in what way this secondary belt is to be made or attached does not appear.

[*Inrolled, January*, 1824.]

Badnall's Patent for Improvements in Dying.

By some accident in our report of this specification, page 20, the latter clause of the invention was omitted.

The second part of the invention is the application of pressure in dyeing in general, "whether it be that of thick cloths, hats, woods for veneering, or any other purpose; or any other, or more delicate materials; such as linen, cotton, or silk goods, lace, &c." The materials intended to be dyed are immersed in the dying liquor, in a suitable vessel, which is closed with a water-tight cover, leaving only a small aperture: to this aperture a hydrostatic pump is attached, or a column of water or mercury is employed, upon the principle of *Bramah's press*, until a sufficient pressure is obtained.

If the goods are put into the vat in a dry state, or rendered nearly so by wringing, the effect will be considerably improved, and the operation facilitated by this mode of pressing the dyeing liquor into the pores of the materials operated upon. If found necessary mechanical means may be resorted to for agitating the goods, or wringing them while under the pressure; such mechanical contrivance, however, is not claimed except in conjunction with the hydrostatic pressure above described.

Original Communications.

On the Phenomenon of Light. By JOS. LUCKCOCK, Esq.

(Continued from page 261.)

WE must not forget the profound, the wonderful query! Whether light and common matter are not convertible into one another? What a cheering doctrine; after putting *out* the sun, to revive our spirits with the hope that this globe may, in the grand laboratory of nature, be converted into a sun, for the use of the Lunarians,

But let us humbly suggest another query to these philosophers; whether it would not be less difficult to collect all the scattered rays in the universe, and *begin again*? There is no opinion so silly and ridiculous, but has had some philosopher or other to support and defend it. Ponderable matter can never become imponderable; neither can imponderable matter, or fluidium, be ever weighed in a balance.

That light is produced by different electrical relations, is evident. What are the sparks from an electrical machine, but fluidium passing from a positive to a negative conductor? What is combustion, but the union of a substance in a positive state of electricity, with another substance in a negative state? And the evolution of heat, and light, may depend upon the annihilation of these opposite states, which happens wherever they combine. In the voltaic apparatus, the wire attached to the zinc plate will be positively electrified, and the wire attached to the copper plate will be negatively electrified; when from 500 to 1000 double plates are brought into action, very brilliant effects are produced, when the opposite poles are properly united by conductors. Thus, if a piece of charcoal, united with the negative wire, be made to touch another piece, united with the positive wire, a bright spark, and intense ignition ensue; and by slowly withdrawing the points from each other a constant current of fluidium takes place through the heated air, producing a magnificent arc of intense light. When the communication between the points of charcoal is made in rarefied air, the annihilation of the opposite electricities takes place at some inches distance, producing a stream of deep purple light. This demonstration may make it appear that, Moses was a better cosmogonist than the modern philosopher. That the sun is not the fountain of light,

which is inherent in universal nature, and only requires the proper combination of ethereal fluids to be produced; and that there might be light before the sun was created, but not upon the modern system; one of the two must be wrong, Evangelism and Philosophy are here at variance.

On immersing the wires from the extremes of the apparatus in water, it is found that the fluid suffers decomposition, and that oxygen gas is liberated at the positive wire, and hydrogen at the negative.

All other substances are decomposed with similar phenomena; the inflammable element being disengaged at the negatively electrical surface, while the bodies called supporters of combustion, or acidifying principles, are attracted by the positive surface.

When bodies are thus under the influence of electrical decomposition, their usual chemical energies are suspended, and some very curious phenomena are observed. It is well known that the strong chemical action between soda, and sulphuric acid, is owing to their electrical relations, the soda being in a positive state of electricity, and the acid being in a negative state; but if their electrical relations are suspended, they have no action whatever upon each other.

Fill the glass tubes A A, (see Plate XVI. fig. 7,) which are closed at top, and open at bottom, with infusion of violets, or red cabbage, and invert them in the basins B B, containing a solution of Glauber's salt, and connected by the glass tube C, also containing the blue infusion. P and N are platinum wires, which pass into the tubes nearly to the bottom, and which are to be connected with the positive and negative extremities of the voltaic apparatus. It will be found that oxygen is evolved at the wire P, and hydrogen at N, derived from the decomposition of the

water. The Glauber's salt, which consists of sulphuric acid and soda, will also be decomposed, and the blue liquor will be rendered red, in the positive vessel, by the accumulation of sulphuric acid; and green in the negative, by the soda; while the acid and alkali will each traverse the tube C, without uniting, in consequence of the electrical relations of those two substances being suspended.

Even those chemical attractions which have been called *elective*, admit of an easy solution upon the principle of Sir H. Davy's electrical arrangements of the voltaic apparatus: thus nitric acid dissolves silver, copper precipitates the silver, iron precipitates the copper, zinc precipitates the iron, and potassa precipitates the zinc; which is thus explained, silver is positive, the acid negative; but silver is negative to copper, copper is negative to iron, iron is negative to zinc, and zinc is negative to potassa; or if exhibited in a tabular form,

Nitric Acid	Potassa Zinc Iron Copper Silver	Each of these is positive to all below, and negative to all above.

If nitric acid be exposed to a very strong light, it will give out oxygen gas, and be converted into nitrous acid. If a mixture of equal volumes of the gases called chlorine and hydrogen, be exposed in a dark room, they slowly combine, and produce muriatic acid gas; but if exposed to the strong light of an unclouded atmosphere, the combination is very rapid, and often accompanied by an explosion. Chlorine and carbonic oxide have scarcely any tendency to combine, even at high temperatures, when light is excluded; but exposed to a strong light, they enter into chemical union. Chlorine has little action upon wa-

ter, unless exposed to light, and in that case the water, which consists of oxygen and hydrogen, is decomposed. The hydrogen unites with the chlorine, to produce muriatic acid, and oxygen is evolved in a gaseous form. Scheele threw the prismatic spectrum upon a sheet of paper, moistened with a solution of nitrate of silver, a salt quickly decomposed by the agency of light; in the blue and violet rays the silver was soon reduced, producing a blackness upon the paper; but in the red rays scarcely any similar effects were observed. Wollaston and Ritter discovered that these chemical changes were most rapidly effected in the space which bounds the violet ray, and which is out of the visible spectrum. Sir H. Davy has observed, that certain metallic oxides, when exposed to the violet extremity of the prismatic spectrum undergo a change, similar to that which have been produced by exposure to a current of hydrogen: and that when exposed to the red rays, they acquire a tendency to absorb oxygen.

In nature the influence of light is very complex, and the growth, colour, flavour, and even the forms of many vegetables are much dependent upon it.

This is seen in many plants which are protected from the light; celery and endive are examples; and plants, which are made to grow in a room imperfectly illuminated, always bend towards the aperture by which the light enters. The change too which vegetables effect upon the circumambient atmosphere, are influenced by the same cause. In the night-time the leaves of plants always exhale carbonic acid, but in the day they evolve oxygen.

These facts clearly illustrate the doctrine of chemical action, depending entirely upon electrical relations, and the wonderful powers of light in effecting those changes.

The sun and stars are differently constituted to the planetary bodies; in the planetary bodies light is only partially produced, either by nature, or by human means; but the sun appears to be so constituted, that changes in the electrical relations are vivid, and perpetual; these electrical relations, besides heat, produce on his body an immensity of light; a light so intense, as to excite in our atmosphere, (*half positive, half negative,*) those electrical changes, which produce that rapid, and universal developement of *fluidium*, that give heat and light to the world.

We shall conclude, as a natural consequence, with some remarks on the *borrowed light* of the moon. The moon is said to shine with a borrowed light; viz. that the sun's rays are *reflected* from the surface of the moon to the earth. The moon, like our earth, is a globe; a globe that reflects the image of any object, whether dark or luminous, must be a convex mirror; and this phenomenon of the moon, must be subject to the laws of convex mirrors. When an object is seen reflected from a convex mirror it is always diminished in size, and the smaller the mirror, the smaller the object will appear. The reflected object never appears the full size of the reflecting surface, but is diminished in the same manner as an object seen through the small end of a telescope. The rays from any object thrown upon a convex mirror always *diverge*, and inversely as the diameter of the mirror; consequently very few of those rays can enter the eye; if we move, the picture moves after us, for the angle of reflection must be equal to the angle of incidence; and if twenty persons are looking at the same time, the image will be seen in as many different spots on the surface of the mirror, but never extended over the whole surface.

These plain facts, which no one will attempt to controvert, render it impossible to give our assent to the

moon shining with a borrowed light. This phenomenon is much more rationally accounted for, by supposing the moon to be similarly constituted to our earth: that it is surrounded by an atmosphere, consisting of at least two elastic fluids, *one positive, the other negative;* which being excited by the intense *light* of the sun, those electrical changes take place in her atmosphere, that cause her to shine by her *own*, and not by a borrowed light.

I now come, more immediately, to treat of the enquiry of the Academy of Sciences. "To determine the density which liquids, and especially mercury, water, alcohol, and sulphuric ether, acquire by compression equal to the weight of several atmospheres; and to measure the heat produced by such compression."

The quantity of fluidium, united to ponderable matter, is inversely as their specific gravities; solid matter, including the metals contain, the least; in fluids the quantity is considerably increased; but in the gases it is greatest of all.

The quantity of heat forced from any of these substances, particularly the two former, by compression, or by diminution of temperature, which operates exactly with the same effects, is perfectly indefinite, and depending entirely upon circumstances whether it shall be affirmative or negative, anything or nothing; if a heavy pressure or diminution of temperature be gradually applied, fluidium will be abstracted, but no heat; whereas, if a less pressure is rapidly brought into action, then heat will be disengaged; but it is by no measure of *quantity*, it is only a measure of the *velocity* with which the fluidium makes its escape.

I forced eight atmospheres of carbonic acid gas into a strong iron vessel; the sides of the vessel became considerably elevated in temperature; if the compression had

taken place in half the time, I should have had double the heat; if the operation had been extremely slow, there would have been no perceptible heat at all. The measure was taken by means of a basin of mercury, a glass tube being set in it open at both ends, as the mercury rose an additional tube was cemented to the upper end, until the column supported was twenty feet high. The number of atmospheres was the measure of increased density, and the heat depended upon the *time* in which the operation was performed. The expansion and contraction of the mercury or alcohol in the thermometer, is very small compared with the fluid in the bulb, and which exactly marks the increments and decrements of *fluidium*, the only source of heat; for, the torrecellian tube at the temperature of 60° Fahrenheit, contains mercury combined or dissolved in all the fluidium which it is capable of taking up at that temperature, the upper part of the tube being filled with uncombined fluidium; on the temperature being raised the mercury appears to expand, but the fluidium is not condensed, fluidium is incapable of compression; there is no actual diminution in bulk of this imponderable substance, which has been taken up by the mercury, and which has experienced an increase in bulk, and a diminution of its specific gravity. On the contrary, if the temperature is decreased, equivalent to a certain compression, the mercury parts with a portion of the fluidium with which it was combined, is decreased in bulk, is increased in specific gravity, and the fluidium has gained in bulk what the mercury has lost, but no heat.

But nature has set bounds to the power of compression, mercury is gaseous at 670°, and solid at 40°; water is gaseous at 212°, and at 40° it is at its maximum of density, the barometer being 30 inches; nature has drawn the line, and mortals may not pass the barrier. The

attraction of oxygen, hydrogen, and the metal mercury; for fluidium is so great as to be an overmatch for any force that can be applied to them; before oxygen can be exhibited in the form in which it exists in the peroxide of tin, by compression from water, it must be reduced to one sixth of its bulk; but suppose the impossible thing to be done, it does not follow that any heat would be produced.

In this memoir it will be seen, that I have been a voyage of discovery: some of our greatest philosophers have seen the land in the distance; but it was to them untrodden ground. In endeavouring to explain away that nonentity, called vacuum, I have added to our views the grand sublimity of nature, in the powers of the Creator filling all created space with fluidium; I have endeavoured to define the *nature and cause of heat*, and to identify HEAT and LIGHT as the same imponderable substance; I have discovered the specific gravity of solid oxygen, and have ascertained the bulk of the matter of heat, or fluidium contained in the gas, divided into a million parts, and to which I am not aware of having seen any approximation. It would afford me great pleasure to see some of our learned professors take up the subject and perfect the present humble attempt.

Novel Inventions.

Tait's Improved Gasometers.

THE Gasometers employed in storing up gas, until required for use, occupy, upon the old plan, much space, and are attended with considerable expence in erecting. The water tank, whether sunk in the ground, or raised, must be of equal dimensions with the gasometer, both

in breadth and depth. The improved construction, which we are about to explain, affords a means of reducing the depth of the tank, dispensing with the bridge of suspension, and of increasing, at pleasure, the capacity of the gasometer upon a given base; thus rendering a small apparatus capable, if required, of holding a large quantity of gas, the first cost of which will be considerably less than even a small gasometer constructed upon the ordinary plan.

Mr. Tait, of Mile End Road, the inventor, has, we believe, been for some years connected with gas establishments, and is therefore fully aware of the practical defects or advantages of the different constructions of gasometers now in use. Plate XVI. Fig. 8, is a section of his improved contrivance; *a, a*, is the tank, occupied with water; *b, b*, two iron columns, with pulley-wheels on the top; *c, c*, chains attached to a ring of iron, *d, d*, extending round the gasometer, which chains pass over the pulley-wheels, and are loaded at their extremities, for the purpose of balancing the weight of the materials of which the gasometer is composed.

The gasometer is formed by several cylinders, sliding one within the other, as the tubes of a telescope; *e, e, e* is the first or outer cylinder, closed at the top, and having the ring of iron *d*, passing round it, by which the whole is suspended; *f, f*, is the second cylinder, sliding freely within the first, and there may be a third and fourth within these if necessary.

When there is no gas in the apparatus, all the cylinders are sliden down and remain one within the other immersed in the tank of water; but when the gas rises through the water, pressing against the top of the gasometer, its levity causes the cylinder *e*, to ascend. Round the lower edge of this cylinder a groove is formed by the

turning in of the plate iron, and as it rises, the edge takes hold of the top rim of the cylinder *f*, which is overlapped for that purpose. The groove at bottom of the first cylinder fills itself with water as it ascends, and by the rim of the second cylinder falling into it, an air-tight hydraulic joint is produced.

Thus several cylinders may be adapted to act in a small tank of water, by sliding one within the other with lapped edges forming hydraulic joints, and by supporting the apparatus in the way shewn; the centre of gravity will always be below the points of suspension. A gasometer may be made upon this plan of any diameter, as there will be no need of frame work, or a bridge to support it, and the increasing weight of the apparatus, as the cylinders are raised one after the other, may be counterpoised by loading the ends of the chains *c*, *c*.

Large cast-iron tanks upon the old plan, and the bridges for suspending the gasometers, are extremely expensive in erecting; and in London and other populous neighbourhoods where dwelling houses are closely contiguous to the works, great inconvenience would arise from deep reservoirs of water. Both these disadvantages are obviated by Mr. Tait's improved gasometer, and the capacity of one very large vessel, or of several vessels, may with perfect convenience be obtained by these means within very contracted premises.

Perkins's Engine.

[Continued from page 266.]

Mr. Perkins proceeds to describe his first generator, which was cylindrical, seventeen inches external, and twelve inches internal diameter; and twenty-two inches

long; its ends being three inches thick. It stood erect, and operated best when enveloped in fire. The top, however, became much the hottest, owing to the *carrying property* of water, which very much contributed to the success of the experiment. As the metal at the top of the vessel was hotter than the other parts, it became a reservoir of heat, which gave to the water, as it passed through it to the steam-valve, sufficient additional heat to effect the complete conversion of the water into vapour. This, however, depended upon the aperture of the stop-cock; for, if the opening was considerable, steam and water would flow through, there not being sufficient heat in the upper part to decompose the whole; in one instance the top of the generator was, by this circumstance, lowered in temperature about 200 degrees in one minute.

It soon appeared, that neither the form nor the material of which these generators were composed, was the most eligible that could be adopted; they were made of an alloy of copper and tin, which though very strong when submitted to cold water pressure, were extremely brittle when heated to about 5 or 600°. Several of these gave way, without producing the slightest mischief, two by design, and three by accident, which fully demonstrated the perfect safety of the apparatus.

To account for the generators thus rending, without an explosion, it is only necessary to remember that the internal pressure was that of *water* and not *steam*, and, that when the fracture opened, the water rushed out much faster than it could be supplied with heat, by which means the fire became extinguished: and the steam, by that means produced, being of extremely high temperature, had no scalding effect, for the reason we have stated in Vol. VI, page 203.

The cause, therefore, of those disastrous effects heretofore occasioned by the explosion of steam-boilers, is by this mode of generating steam entirely removed: and instead of the immense magazine of steam and heated water, the explosion of which has been so often fatal, "only one pint of water per horse power is used, while from fifty to seventy gallons per horse is necessary for condensing engines."

Reduction in the quantity of water employed is thus effected, equal to about ninety per cent., and in the danger to be apprehended, in a still greater proportion; for as the capacity of the steam-vessel is diminished, the capability of increasing its strength is increased, and, indeed, danger may now be considered to be entirely out of the question.

The next fact that developed itself was, that particles of matter, whether metal or other substances, would rise from the bottom of the generator when the stop-cock at top was opened. This arises from a property in high steam, which does not permit deposits or incrustation to take place in the generator, and therefore the quality of the water employed, whether fresh or salt, is unimportant, as all the pipes and other vessels will remain perfectly clean.

It was further discovered, that though a fracture had in one instance occurred in the generator, sufficiently large to have let off all the water, yet, by keeping up a sharp fire, the engine was enabled to work all day without the steam or water escaping. But when the temperature was lowered, the water flowed out, and it was found useless to attempt to check it. By allowing the generator, however, to cool down to 212, and by making a new sharp fire under its bottom, the steam was again raised, and in this way the engine was worked many days, for

the purpose of noticing this curious fact. Mr. Perkins considers, that this experiment accounts for the circumstance, that the bottoms of steam-boilers and stills frequently burn and crack; which has been ascribed to the non-conducting property of the deposits, instead of the non-conducting power of the stratum of steam, which separates the water from the bottom of the boiler or still; and clearly proves, that when the temperature of the metal is much above that of the water, it will be driven from it by the repulsive force of the heat, although under great pressure.

Another fact observed was, that when the steam was (as it is termed) much wire-drawn, the throttle-valve indicated a temperature of 200° above the steam within the generator, by which it is concluded that there will be very little, if any, loss of heat by condensation within the cylinder, or any other part of the engine.

Mr. Perkins states: "The difficulty of getting my generator made tight enough has occasioned great delay, which very much alarmed my friends, and gave an opportunity for my opponents to say, that the visionary scheme had, as they prognosticated, entirely failed; but as I never once doubted that I should succeed in getting my generators made to my mind, I felt quite at ease on that score. I however extremely regretted the delay which this practical difficulty occasioned, especially as the public mind was highly excited, in consequence of the great expectations raised by the novelty and promise of the theory. I have at last the pleasure of having my anticipations and wishes perfectly gratified. After con-consulting with Mr. James Russell, of Wednesbury, in Staffordshire, on the best method of executing this piece of work, he, at a considerable expense, has succeeded in delivering me the best piece of workmanship, in wrought

iron, that was perhaps ever produced. This part of the generator (which is denominated the receiver) has sustained a pressure of 1400 atmospheres, or 19,600 lbs. on the square inch: it is cylindrical, eight inches external, and five inches internal diameter, with each end drawn in hemispherically; it is made of scrap iron, and without joint or rivet."

Mr. Perkins is building, to order, several engines for steam-vessels; and an engine of very extensive power, for one of the Cornish mines; having, as he considers, completed his plans in every particular, to his utmost satisfaction.

The following short account of what led to the invention of the Steam-Gun, which is quite in its infancy, may not be uninteresting.

"OBSERVING, while experimenting with the generator, that substances, whether metallic or otherwise, when they rose from the bottom of the generator through the tube of the stop-cock, were projected with great velocity; the thought naturally struck me, that with a properly constructed gun, projectiles might be thrown with great power and economy. It also appeared to me, that it would at once settle the important question respecting velocity, as well as power of high elastic steam. No time was therefore lost in constructing a gun, and on the first experiment my most sanguine hopes were realized, as musket-balls, at the rate of 240 per minute, were projected with a velocity equal to gunpowder. I dare not speculate on the consequences of this discovery, as I feel satisfied, that the power, economy, and simplicity of this agent is such, that one projectile may be found sufficient to force any breach, or sink the largest ship, though it

gives me great pleasure to hear the opinion so often repeated, that this power will be to gunpowder, what that has been to the arrow.

"I have found that forty atmospheres' pressure is equal to gunpowder; viz. an ounce ball discharged against an iron target from a six foot barrel about one-thirty-second part smaller than the ball, was flattened to 2½ inches in diameter; and at 45 atmospheres, its blow against the target liquified the lead. An ounce ball discharged from a musket with powder, with the common field charge, at the same distance, did not show more effect. It is said, with great plausibility, that there must be some fallacy in this experiment, for as it takes from 500 to 1000 atmospheres' pressure to propel a ball with proper effect with powder, it is asked how can it take but 40 or 50 atmospheres of steam to do the same? Having the fact before me, I think I can find the reason, which I have no doubt is the same as that, why fulminating powder, although infinitely stronger than gunpowder, will not (though it bursts the gun), throw the ball one-twentieth part so far, the power being too instantaneous for projectiles; gunpowder being less so, gives greater effect, although the mechanical pressure is much less. *Steam power acting with constant pressure on the ball until it leaves the gun, in consequence of the non-diminishing generation of it*, is, I believe, the cause of the increased effect."

Polytechnic and Scientific Intelligence.

Royal Society.

(*Continued from page 270.*)

March 4th.—"Some further particulars of a case of Pneumato Thorax," by J. Davey, M.D. F.R.S.

A description of this case has already appeared in the Philosophical Transactions of 1823, in an appendix to Dr. Davey's paper, and in which the operation of tapping as performed on the patient was detailed. The hopes entertained for the recovery proved groundless; the progress of the disorder, and the analysis of the air found in the chest, were the subjects treated of in the present paper.

Evident symptoms of hydro-thorax, accompanied with a collection of air in the left cavity of the chest, were observed a considerable time before the death of the patient. A consultation determined on a second operation; and, as considerable difficulty had been experienced in penetrating the intercostal space, the mode of perforating, according to Hippocrates, was adopted. Having laid bare a part of the fifth rib with the scalpel, a carpenter's auger was employed to penetrate it, and on the pleura being punctured with a trochar, about fourteen ounces of fluid, composed of albumen and a slight portion of subcarbonate of soda (but no free carbonic acid) was obtained; and in the course of six weeks about twenty pints of fluid was collected. At three different times, by the application of the trochar and bladder, air was obtained from the orifice, which, on examination with lime and phosphorus, was found to consist of 88 to 90 per cent. of azote, two to four carbonic acid, and three to five oxygen. The patient at first experienced considerable relief, but at length sunk under the disorder.

On the body being examined, the right pleura was found to contain about six ounces of pus, and on close inspection the right lung was found full of small globular tubercles. The left lung was so much condensed, that a pair of double bellows attached to the trachea was not sufficient to inflate it, and the heart was thrown obliquely

on the spine towards the right side. The body was opened in a bath, and 170 cubic inches of gas, consisting of sixteen carbonic acid, a small portion of oxygen, and the remainder azote, were collected from it ; which Dr. Davey considers to be atmospheric air deterioated by respiration, and altered by the absorption it had undergone while in the body. He had found from nine to twelve per cent. of carbonic acid in the lungs in various cases after death.

March 11*th.*—A paper by J. Brinkley, D.D. F.R.S., &c. was read on the Parallax of Δ Lyrae in which Dr. B. entirely contradicts the assertions of Mr. Poud, relative to his paper, as printed in the Philosophical Transactions of 1823.

March 18*th.*—A paper entitled "*An Account of Experiments on the Velocity of Sound, made in Holland.*" By Dr. G. A. Mole, and Dr. A. Van Beck.

After some preliminary observations on the effect of the wind on the velocity of sound, the authors proceeded to detail their own experiments, which were made on the plains of Utrecht. Two stations were erected at the distance of 9,964 feet from each other, and the interval of time between the flash and report of guns, were determined by clocks with conical pendulums, dividing the 24 hours in 10,000,000 parts. The state of the atmosphere was particularly noticed by the barometer, thermometer, and hygrometer; and, as a general result, it is stated, that at the temperature of 32° the velocity of sound is 1089,7 feet in one second. Tables of the experiments, &c. &c. were annexed to the paper.

March 25*th.*—Major-General Sir John Malcolm was admitted a Fellow.

A paper was read in continuation of one published in the Philosophical Transactions on the Geological distribution of shells, by L. W. Dylwyn, Esq. F.R.S.

A letter was read from Thomas Tredgold, Esq. to Thomas Young, M.D. For. Sec. R.S. containing, "*An account of various Experiments made on the Elasticity of Steel, at various Tempers, with a Description of the Apparatus.*"

April 1st.—A paper was commenced, entiled "*An Enquiry respecting the nature of the Lampyrides, L. Splendidula, or Glow-worm; L. Italia, or Fire-fly; and L. Noctiluca.* By Twedie John Todd, M.D. communicated by Sir E. Howe, V.P.R.S.

April 8th.—The above paper was resumed and concluded. After a general review of the opinions respecting the nature of the light emitted from these animals, the writer considers the explanation given by Macartney and Macaire as correct; which is, that the light emitted is the simple product of vitality—the sources, characters, &c. of the various lights are then described, and the effects produced on them by a variety of agents. The light of the Lampyris Splendidula is of a fine topaz colour, tinged with green, and sufficiently vivid, within the compass of a few inches, to shew the hour on a watch; that of the Fire-fly is of a pale yellowish hue, with repeated flashes of a brilliant light, which may be seen in a bright moonlight, which is not the case with any other animal of the species. The light is supposed to guide the male to the female in the season of impregnation.

A paper by Capt. Edward Sabine, F.R.S. entitled "*A Comparison of the Barometrical Measurement of Altitude with that by Trigonometry,*" which details the comparative measurement of a hill in Spitzbergen, by both methods, in July last. The greatest attention was paid to the correctness of the instruments employed; the barometers were made with iron cisterns, under the superintendence of Mr. Newman, from the description of Mr. Daniel;

the experiments were frequently repeated, and every circumstance which was thought capable of influencing the correctness was considered: one instrument was conveyed to the top of the hill, and was there stationary several days; the result of the geometrical measurement was 1643 feet; by the barometer, 1640 feet, and a fraction, being a difference of less than three feet between the two methods. From this very slight difference Capt. Sabine hopes, that the ease with which the barometer measures altitude, will cause it to be generally adopted by those who are practically acquainted with its use, particularly as doubts, (which the experiments of Capt. Phipps, and Dr. Irving, have raised) as to its applicability to the northern regions are found to have resulted in error.

On account of the approaching festival the Society adjourned till the 29th of April.

Astronomical Society of London.

[Continued from page 273.]

May 14th.—The remainder of the paper, to which we alluded in our last report, "*On the Method of determining the difference of Meridians by the Culmination of the Moon.*" By Francis Baily, Esq. F.R.S. was read this evening, and occupied the entire attention of the Society. Its contents were very interesting, and we shall therefore give as detailed an account of them as our limits will allow.

Mr. Baily commenced, by an examination of the usual nautical methods of determining the longitude, and enumerated five distinct processes: viz. 1st. By observing the eclipses of Jupiter's Satellites. 2nd. Eclipses of the Moon. 3rd. Eclipses of the Sun. 4th. Occultations of the fixed

Stars. 5th. Meridional Transits of the Moon. The three first of these phenomena are of such rare occurrence, and are so difficult to observe with precision, that they are of very limited use. The 4th process is attended with difficulty, and some uncertainty, because it involves the consideration of a question, respecting which, mathematicians are not perfectly agreed; namely, the compression of the earth at the Poles, and some other intricacies which were pointed out: while the fifth method, which has received the sanction, and even been pointed out and recommended by the most eminent astronomers, for many years past, has never met with that consideration which it deserves; on which account those who have practically adopted it, have not conducted their observations on a good basis, but have been content to take the moon's centre reduced to the meridian of the place of observation, and compare it with the apparent place of any fixed stars passing the meridian, about the same time, without regard to their declination, and thus a great number of errors and anomalies have been introduced into their observations, as well as the deductions they made from them.

The attention of astronomers has again been called to this subject, in several recent numbers of Schumacher's *Astronomische Nachrichten*, in consequence of which Mr. Baily determined to investigate this method, and the new mode of treating it, proposed by him in the present paper, is to observe, with a transit instrument, the differences of right ascension between the *border* (instead of the centre) of the moon, and certain fixed stars previously agreed upon, and which differ very little in declination from the moon herself, on which account he calls them *moon culminating stars*. He investigates and gives the several formulæ necessary to this mode of observation, and reduces them

to one general form, and concludes by stating, that this method will save much time and trouble, while it precludes many sources of error, and what is very important, that it is *universal*, without involving the question of the earth's compression.

National Gallery.

During the past month our attention has been repeatedly drawn to the interesting and valuable collection of paintings, recently purchased by the nation from the executors of the late Mr. Angerstein, and now laid open to public inspection in Pall Mall. The well known purity of Mr. Angerstein's taste, and his good fortune in having redeemed from the obscurity of a foreign country some of the most precious treasures of genius, had long established the celebrity of his Picture Gallery among the lovers of the arts; but notwithstanding the liberality of that gentleman's mind allowed the readiest access to his collection, we ourselves had never taken an opportunity of visiting it: it did not come under the public view in any shape—it formed one only of the numerous rich private collections which the taste and individual spirit of some of our distinguished countrymen have brought together in England, and we forbore to notice it, and many others under similar circumstances, from a feeling of vain regret that this country, vast as is its wealth and unbounded its public spirit, should possess no one public establishment connected with the arts and sciences, at all worthy of the genius and character of its inhabitants: and from this sweeping but not indiscriminate censure we do not except even the British Museum; for the lustre shed on that collection by the Elgin Marbles, and its Library, we think insufficient to redeem it from the character of a mere

"jumbling heap of auld nick-nackets." We repeat that we felt deep regret on this subject. The paintings of what are called the old masters are among the noblest monuments of human art; and we have always thought it above all things desirable that the opportunity of seeing them should be universally extended; for by showing what *has been* done by patient and humble genius, they point out what *may be* done again, and are thus at once the incentives and the guides to future excellence.

Until lately, however, they have in too many instances been guarded from view, with the most jealous rigidity; and the circle of the mighty magicians has been contracted, and their influence lessened by this monopoly, though England is perhaps richer in genuine original paintings, than any other country in Europe. The first step, however, (for we would fain consider it merely a *first* step) is now taken to remedy this evil: we were surprised that our government allowed the magnificent Houghton Collection to be purchased by the Empeıor of Russia, and it was with no ordinary interest, therefore, that we received the gratifying information that the purchase of Mr. Angerstein's small but select gallery had been made, and at the comparatively low price of fifty thousand pounds. We congratulate the nation on this measure, as an auspicious proof of the growing discernment and good taste of those who are charged with the administration of public affairs; we believe that we are indebted for it more immediately to the express wish of his Majesty, and that the suggestion originated with that munificent patron of the arts, Sir Charles Long; and we do think that in future ages, when this institution shall be as distinguished for the *number* as for the *quality* of the paintings it contains, and when our own artists shall produce pictures worthy of being ranked with those of the elder schools;—we do think, we

say, that the establishment of the *National Gallery* will then reflect more honour on the reign of George the Fourth, and the nineteenth century, than even the long and splendid train of triumphs terminated by the crowning glory of Waterloo.

We hope that there are those among our nobility and gentry who will be disposed to mingle their names in the immortality of this measure, and by contributing to the treasures of the National Gallery, establish for themselves claims to the eternal gratitude of the country. The valuable collections of the Duchess of Dorset, the Marquess of Stafford, Earl Grosvenor, Mr. Miles, M. P., Mr. Lambton, M. P., &c. &c., even if added to the National Gallery, would still be as much the property of these distinguished individuals as at present; whilst the advantages resulting to the arts, and the enhancement of the honor and character of the nation would be incalculable. The effect of such numerous and varied perfections collected in one focus, and their diligent study with the facilities which we are certain the liberality of the trustees would afford, we flatter ourselves would in a few years enable us to visit the annual exhibitions of our Academy without feeling the blush of shame on our cheeks, that we should be Englishmen, or that such should be the productions of the collective talent of English artists. We must say that (with occasionally an exception) these are the only feelings excited in our bosom; and if we do continue to visit Somerset House, it is more from a habitual compliance with the fashion of the day, than from any lingering hope of having the pleasure to observe the indication of dawning genius, or to record any striking or essential advancement of the arts.

But we are wandering from our path, and in fact have been led into so many reflections on this to us most in-

teresting subject, that we find with regret that we have not left ourselves space for a detailed notice of the eight-and-thirty paintings which grace the National Gallery. Next month we shall enter on this pleasing task.

Royal Academy.

THE present is the fifty-sixth Exhibition of native talent under the auspices of this Royal establishment, and if we were to judge of the state of the fine arts in this country, by the specimens here produced, we should feel disposed to acknowledge that the British school had passed its meridian, and was rapidly verging towards its declination; but the project of another institution in the metropolis, for the encouragement and display of the fine arts, which was so imperatively called for by the abuses or mismanagement at the Royal Academy, has been received with such prompt support, that we believe the parent foundation has found it rather difficult, in the present instance, to collect sufficient materials to form what they might consider a tolerably respectable exhibition. We cannot however help thinking that a very large portion of the specimens, which at present decorate the walls of the academy, reflect but little credit upon the judgment of the *hanging committee*, and, indeed, to speak plainly, are a perfect disgrace to the institution

Besides the general paucity of talent, out of one thousand and thirty-seven subjects, nearly *six hundred* are portraits, mostly of persons unknown to the world; and among the productions of fancy, there are but few gems, certainly no brilliants; we will mention the most striking.

No. 20, "The Cherry-seller, a scene at Turvey, Bedfordshire, by *W. Collins, R. A.*" is a pretty picture, and displays talent. No 34, "Abbeville—a Juggler exhibiting his trick, by *G Jones, R. A.* elect," is clever, but not equal to the preceding. No. 55, "Arundel Castle, the seat of the Duke of Norfolk, by *W. Daniell, R. A.*" is a very good picture, both in colouring and effect. No. 72, "View from the Park at Arundel," by the same, is by no means so well coloured. No. 95, "Sancho Panza in the apartment of the Duchess, by *C. R. Leslie*," is in many parts extremely clever. No. 110, "Smugglers offering run Goods for sale or concealment," and No. 115, "Cottage Toilette, from Allan Ramsay's Gentle Shepherd, by *D. Wilkie, R. A.*" are by no means equal to his former productions; and No. 113, "The Widow, by *W. Mulready, R. A.*" is far from being a good picture, either in design or execution. No. 139, "Distant View of the Marhatta Country, from the Boa Ghaut between Bombay and Poonah, with military figures, by *W. Westall, A.*" exhibits very extraordinary scenery, and is very prettily painted. No. 160, "Rochester from the River below the Bridge, by *A. W. Callcott, R. A.*" is tolerably good upon the whole, but the middle ground of the picture is too misty for its distance. No. 161, "Amorett delivered by Britomart from the spell of Busyrane (Spenser's Fairy Queen), by *H. Fuseli, R. A.*" is the same sort of dirty smear that we have been used to see from this artist. No. 185, "English Travellers attacked by Banditti, on the road to Rome between Gaeta and Terracina, by *D. Dighton*," is a bold, well-conceived subject, but the characters are rather coarsely drawn. No. 251, "Stage Coach Travellers, by *Rippingille*," as far as design goes, is extremely good, but certainly is very indifferently painted. No. 263, "A Highland Clan escorting the Regalia of Scotland, by *D. Dighton*," is very flat

and dingy. No. 285, "Lord Patrick Lindesay of the Byres, and Lord William Ruthven, compelling Mary, Queen of Scots, to sign her Abdication, by *W. Allan*," has some tolerable parts, but, upon the whole, is tame. No. 350, "Sunset after a Storm, by *F. Danby*," is the most extraordinary picture in the collection: such a peculiar distribution of black, blue, red, and yellow in streaks certainly never was placed upon canvas before.

No. 361, "The Barrier and Village of Passey, near Paris, by the Rev. *R. H. Lancaster*," would have done great credit to a professional artist; as the production of an amateur it is admirable. No. 375, "View of the High Street, and Lawn Market, Edinburgh, by *A. Naysmith*," is, perhaps, one of the best pictures in the exhibition; had the fore-ground been something brighter, the effect would have been greatly improved.

There are few other subjects, in the painting department, worthy of notice; we, therefore, proceed to the Architectural:—No. 844, "A Geometrical Elevation of Part of one of the Fronts of an Idea: (an idea we hope it will always remain) for an Imperial Palace to be built in ten years at 300,000*l.* per annum, by *J. Gandy, A.*" This is one of the strangest composition ever put together. No. 970, "Is a rough Cork Model of a Design for a Church, by the same gentleman," in which there is certainly some novelty and good effect; we object to Greek churches, but, if they are to be built, there are points about this design that may be desirably appropriated; we do not, however, mean to approve the detached steeple. No. 976, "A Monumental Device, by *J. Bacon*," is certainly not above mediocrity. No. 983, "A Bacchante asleep, in marble, by *R. W. Sievier*:" this is nearly

as large as life, and is extremely beautiful; we are really astonished at this young artist; scarcely has three years elapsed since he first took the chisel in hand, and we find him in very respectable competition with Chantrey. No. 1006, "Statue of the late Dr. Cyril Jackson, Dean of Christ Church." No. 1008, "Statue of the late Countess of Liverpool." No. 1010, "Statue of the late James Watt, by *F. Chantrey*," we need only say are executed in his usual style of excellence. No. 1007, "Statue of the infant Son of J. Hope, Esq., by *W. Behnes*," is extremely pretty: and No. 1019, "The bust of Fuseli, in marble, by *E. H. Baily, R.A.*" does much credit to the artist.

New Patents Sealed, 1824.

To Alexander Dallas, of Northumberland Court, Southampton Buildings, in the Parish of Saint Andrew's, Holborn, in the county of Middlesex, engineer, for his invention of a machine to peck and dress stones, of various descriptions, particularly granite stone.— Sealed 27th April.— 6 months.

To John Turner, of Birmingham, in the county of Warwick, brass and iron founder, for his invention of a machine for crimping, pleating, and goffering linen, muslins, frills and other articles.—Sealed 27th April.— 2 months.

To George Vaughan, of Sheffield, in the county of York, gentleman, for his invention of an improvement or improvements on steam-engines, by which means power will be gained and expense saved.—Sealed 1st May.— 6 months.

To John Crosley, of Cottage Lane, City Road, in the County of Middlesex, gentleman, for his invention of an improvement in the construction of lamps or lanterns, for the better protection of the light against the effects of wind or motion.—Sealed 5th May.—6 months.

To James Viney, of Shanklen, in the Isle of Wight, colonel in the Royal Artillery, for his invention of certain improvements in, and additions to, water closets.—Sealed 6th May.—6 months.

To William Cleland, of Leadenhall Street, in the city of London, gentleman, for his invention of certain improvements in the process of manufacturing sugar from cane juice, and in the refining of sugar, and other substances.—Sealed 6th May.—6 months.

To John Theodore Paul, late of Geneva, but now residing at Charing Cross, Westminster, in the county of Middlesex, mechanist, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in the method or methods of generating steam, and in the application of it to various useful purposes.—Sealed 13th May.—6 months.

To John Potter, of Smedley, near Manchester, in the county palatine of Lancaster, spinner, and manufacturer, for his invention of certain improvements in looms, to be impelled by mechanical power, for weaving various kinds of figured fabrics, whether of silk, cotton, flax, wool or other materials or mixtures of the same; part of which improvements are applicable to hand looms.—Sealed 13th May.—6 months.

To Jacob Perkins, of Fleet Street, in the city of London, engineer, for his invention of an improved method of throwing shells, and other projectiles.—Sealed 15th May.—6 months.

To William Church, of Birmingham, in the county of Warwick, engineer, for his invention of certain improvements in the apparatus used in casting iron, and other metals.—Sealed 15th May.—6 months.

To John Holt Ibbetson, of Smith Street, Chelsea, in the county of Middlesex, Esq., for his invention of certain improvements in the production or manufacture of gas.—Sealed 15 May.—6 months.

To Lemuel Wellman Wright, of Well Close Square, in the county of Middlesex, engineer, for his invention of certain combinations of, and improvements in, machinery for making Pins.—Sealed 15th May.—6 months.

To Joseph Luckock, of Round Cottage, Edgebaston, near Birmingham, in the county of Warwick, gentleman, for his invention of certain improvements in the process of manufacturing iron.—Sealed 15th May.—6 months.

To William Henry James, of Cobourg Place, Winson Green, near Birmingham, in the county of Warwick, engineer, for his invention of an improved method of constructing steam-carriages, useful in the conveyance of persons and goods, upon high-ways and turnpike-roads, without the assistance of rail roads.—Sealed 15th May.—6 months.

To Thomas Parkin, of Baches Row, City Road, in the county of Middlesex, merchant, for his invention of certain improvements in machinery, or apparatus, applicable to, or employed in, Printing. — Sealed 15th May. 4 months.

D.	H.	M.	S.	
1	0	0	0	☉ declination 22° 5′ 42″ N.
1	2	20	0	♃ passes the meridian, declination 23° 1′ N.
1	3	48	0	☽ passes the meridian.
1	22	56	0	♀ Passes the merid. dec. 18° 4′ N.
2	4	0	0	☽ in conj. with ξ in Leo.
2	8	0	0	☽ in conj. with ο in Leo.
2	17	0	0	☽ in conj. with π in Leo.
3	21	9	0	☽ in □ first quarter.
4	18	40	0	♀ in conj. with ♄ long. 29° 34′ in Taurus ♀ lat. 53′ S. ♄ lat 1° 50′ S. dif. lat. 57′
6	0	0	0	☉ dec. 22° 41′ 19″ N.
6	7	58	0	☽ Pass es the meridian.
9	22	0	0	☽ in conj. with σ in Scorp.
11	0	0	0	☽ in conj. with ϑ in Oph.
11	0	0	0	☉ dec. 23° 7′ 1″ N.
11	2	0	0	☽ in conj. with B. in Oph.
11	2	38	0	Ecliptic opposition ○ Full moon.
11	12	20	0	☾ passes the meridian.
12	16	0	0	☾ in conj. with 1 γ in Sag.
12	21	0	0	☾ in conj. with ο in Sag.
13	0	0	0	☾ in conj. with π in Sag.
13	1	41	0	♃ Passes the merid. dec. 22° 46′ N.
13	2	0	0	☾ in conj. with ♅ long. 14 55′ in Capri. ☾ lat. 30′ N. ♅ lat. 25 S. diff. lat. 55′
13	17	0	0	♂ in conj. with ν in Sag.
13	23	7	0	♀ passes the merid. dec. 21° 21′ N.
14	23	0	0	♃ in conj. with δ in Gemini.

D.	H.	M.	S.	
15	0	0	0	☿ Stationary.
16	0	0	0	☉ dec. 23° 22′ 33″ N.
16	16	13	0	☾ passes the meridian.
19	5	21	0	☾ in □ last quarter.
21	0	0	0	☉ dec. 23° 27′ 48″ N.
21	1	0	0	☉ enters Cancer.
21	8	0	0	☾ in conj. with ν in Pisces
21	19	44	0	☾ passes the meridian.
23	20	0	●	☾ in conj. with ν Taurus.
25	1	3	0	♃ passes the merid. dec. 22 27′ N.
25	19	42	0	☾ in conj. with ♀ long. 25° 43′ in Gemini ☾ lat. 1° 27′ N. ♀ lat. 6′ S. dif. lat. 1° 33′.
25	23	20	0	♀ passes the merid. dec. 23° 15′ N.
26	0	0	0	☉ declin. 23° 22′ 43″ N.
26	0	0	0	☉ eclipsed invisible at Greenwich, but will be centrally eclipsed in long. 174° 22½′ W. and in lat. 47° 4½′ N.
26	11	39	0	Ecliptic Conjunction ● New Moon.
27	6	0	0	☽ in conj. with δ in Gemini.
27	10	0	0	☽ in conj. with ♃ long. 18° 53′ in Cancer ☽ lat. 52′ S. ♃ lat. 14′ N. diff. lat. 1° 06′.
29	11	0	0	☽ in conj. with ξ in Leo.
29	15	0	0	☽ in conj. with ο in Leo.
30	0	0	0	☽ in conj. with π in Leo.
30	3	21	0	☽ passes the meridian.

Rotherhithe. J. LEWTHWAITE.

The waxing moon ☽—the waning moon ☾.

METEOROLOGICAL JOURNAL, APRIL AND MAY, 1824.

1824.	Thermo. Higt.	Thermo. Low.	Barometer. +	Barometer. —	Rain in inches.	1824.	Thermo. Higt.	Thermo. Low	Barometer. +	Barometer. —	Rain in inches.
APRIL						MAY					
26	62	47	29,69	29,47	. .	11	55	42	29,91	29,89	. .
27	60	41	,84	—,69	. .	12	55	42	,84	—,82	. .
28	58	51	,85	—,78	. .	13	50	39	,79	—,63	,125
29	70	48	,72	—,63	. .	14	49	41	,52	—,51	,55
30	65	48	,74	—,59	. .	15	47	40	,48	—,46	,525
MAY						16	53	40	,87	—,67	2,025
1	67	45	,89	—,85	. .	17	58	33	,92	—,89	,0375
2	55	48	,85	—,76	,1	18	63	43	,88	—,75	. .
3	49	44	,54	—,48	,3	19	56	42	,75	—,71	,0125
4	51	39	,61	—,54	,4	20	53	39	,73	—,66	. .
5	63	38	,80	—,76	,05	21	57	28,5	,81	—,78	. .
6	63	45	,84	—,80	,065	22	50	31	,88	—,87	. .
7	67	42	,87	—,78	. .	23	60	33	,86	—,84	. .
8	70	45	30,19	30,05	. .	24	54	37	,86	—,84	. .
9	61	47	,22	—,21	. .	25	61	33	30,11	30,30	,05
10	66	49	29,98	29,85	. .						

CHARLES ADAMS, LOWER EDMONTON.

LITERARY NOTICES.

Belzoni.—There is some reason to believe that Belzoni kept journals of his proceedings, from his first arrival at Tangier, in April, 1823, to his departure from Teneriffe, in September, and that he continued these journals to the last. It is to be hoped that the paper will be transmitted, according to his desire, to his agents, Messrs. Briggs, and Co. that they may be submitted to the public, and by so doing gain something for the widow of this meritorious individual.

The Ashantees.—Mr. Dupuis, late his Britannic Majesty's Envoy and Consul at Ashantee, is about to publish an account of his residence in that kingdom; it will comprise also his notes and researches relative to the gold coast and the interior of Africa, chiefly collected from Arabic, MSS. and information from the Moslems of Guinea; some expectation is formed of its throwing a light on the origin and causes of the present war.

The fourth volume of the Transactions of the Literary and Philosophical Society of Manchester is to be publishedin th e course of June next.

National Gallery.—The bequest of Mr. Payne Knight, of Bronzes, Antiquities, &c. to the British Museum, is estimated at the value of from sixty to seventy thousand pounds. Thus it may be said, with the splendid gifts of his Majesty, the Royal Library, the Angerstein Pictures, Sir George Beaumont's noble donation of Paintings, and these additional treasures of art, that a magnificent National Gallery is formed: even if we consider it only a nucleus for further accessions, what a matchless collection may be anticipated in a few years

In the press, by Captain F. W. Beechy, R. N. and H. W. Beechey, Esq. a Narrative of the Proceedings of the Expedition dispatched by his Majesty's Government, to explore the northern Coast of Africa, in 1821 and 22; in which will be comprehended an account of Syrtis and Cyrenaica; of the ancient cities, composing the Pentapolis, and other various existing remains, with maps and plates.

Philip Parker King, of the R. N. is preparing on account of four voyages of survey, in the inter-tropical and Western coast of Australia, performed by order of his Majesty's Secretary of State, between the years, 1817 and 1822, in his Majesty's surveying vessels, Mermaid and Bathurst. It will be embellished with maps, charts, views of interesting scenery, &c.

Captain Southey, is about publishing a Chronological History of the West Indies. A work of this nature must be highly interesting; and the value of the publication will be further enhanced by the author's brother, the poet Laureate, writing an introductory history of each century.

The Adventures of the Three Sherleys, (brothers) in Persia, Russia, Turkey, Spain, &c. printed from original MSS. with additions and illustrations, is in the press, in 1 vol. 8vo., it will be embellished with portraits.

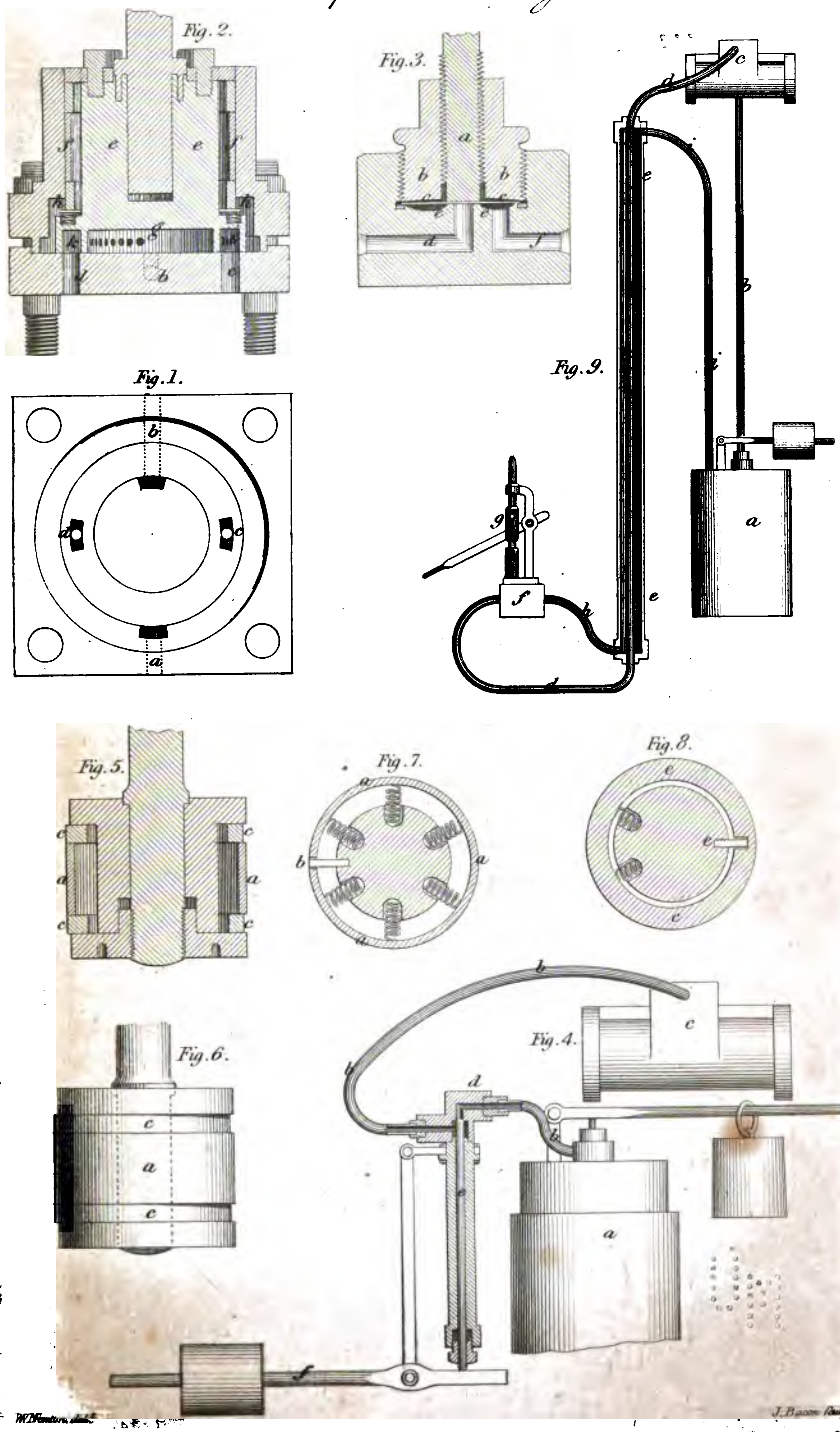
Mr. Loudon, author of the Encyclopædia of Gardening, is about to follow that work with an Encyclopædia of Agriculture; or the Theory and Practice of the Valuation, Transfer, Improvement and Management of Landed Property; and the Cultivation and Economy of the Animal and Vegetable Productions of Agriculture in all Countries, and a Satistical View of its present state, with some suggestions for its future progress in the British Isles.

Early in the present Month, will be published, under the appropriate title of the Danciad, a Descriptive and Satirical Poem on Dancing, and its Professors. By Mr. Wilson, the celebrated teacher of that elegant art, and author of many works of the first merit on the subject.

LONDON:
SHACKELL AND ARROWSMITH, JOHNSON'S-COURT, FLEET-STREET.

INDEX.

Perkins's Imp.ts on Steam Engines.



W. Newton, del.t J. Bacon, Sculp.t

Applegath's Improvements in Printing Machinery.

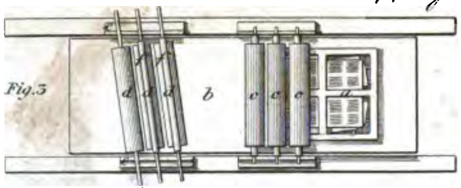


Fig. 3

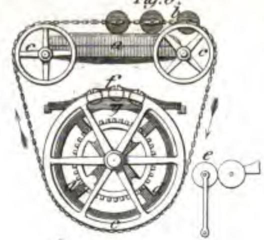


Fig. 6

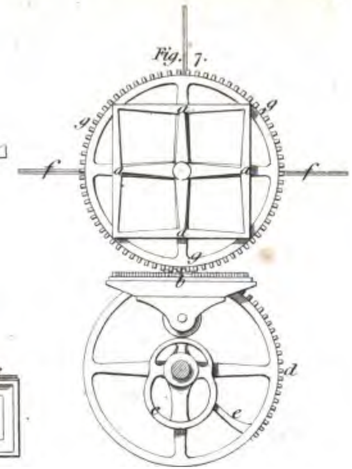


Fig. 7

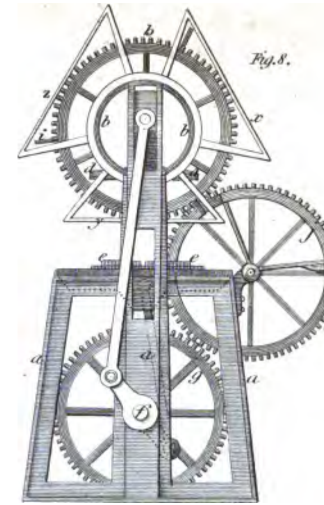


Fig. 8

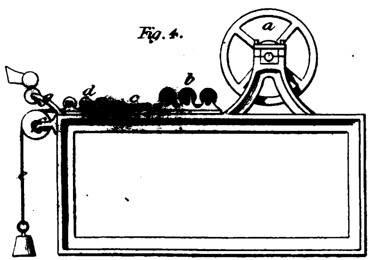


Fig. 4

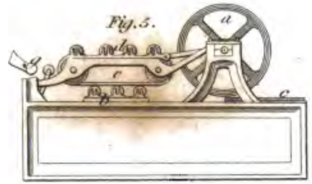


Fig. 5

Brindley's Improvements in Ship Building.

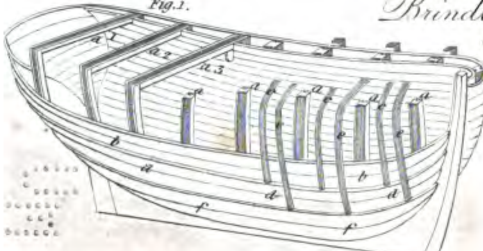


Fig. 1

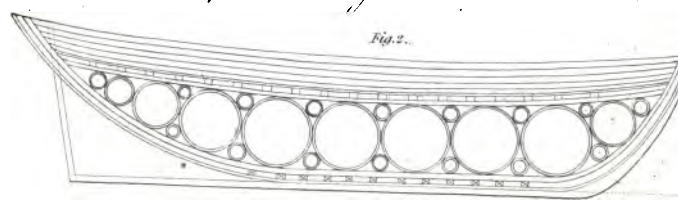


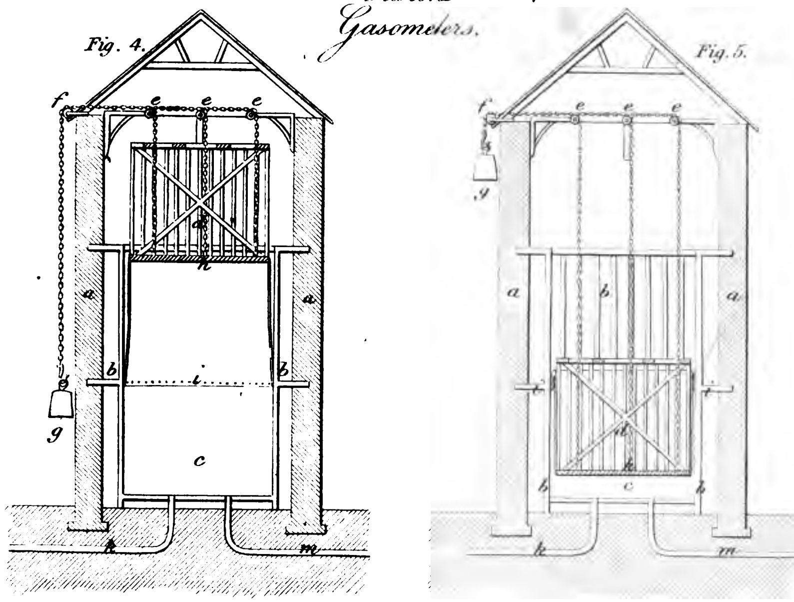
Fig. 2

W. Newton del.

S. Bellin sc.

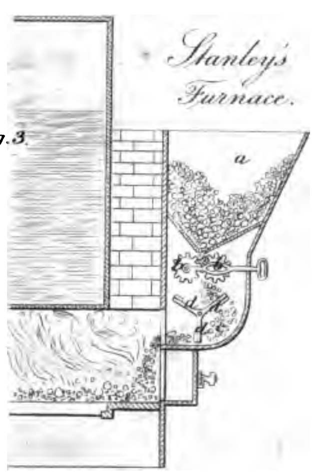
Caston's Gasometers.

Fig. 4. Fig. 5.



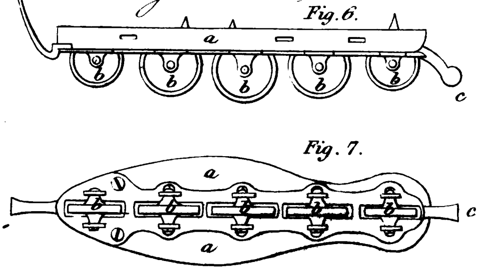
Stanley's Furnace.

Fig. 3.



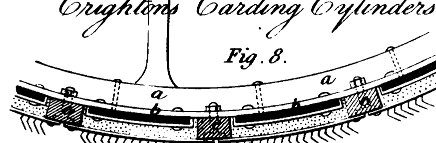
Tyers's Volito.

Fig. 6. Fig. 7.



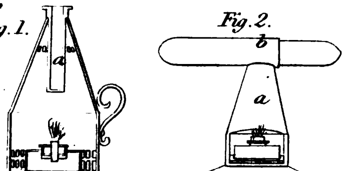
Crighton's Carding Cylinders.

Fig. 8.



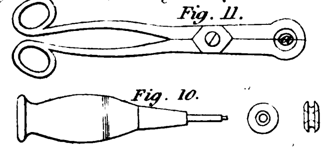
Nicholsons Heaters.

Fig. 1. Fig. 2.



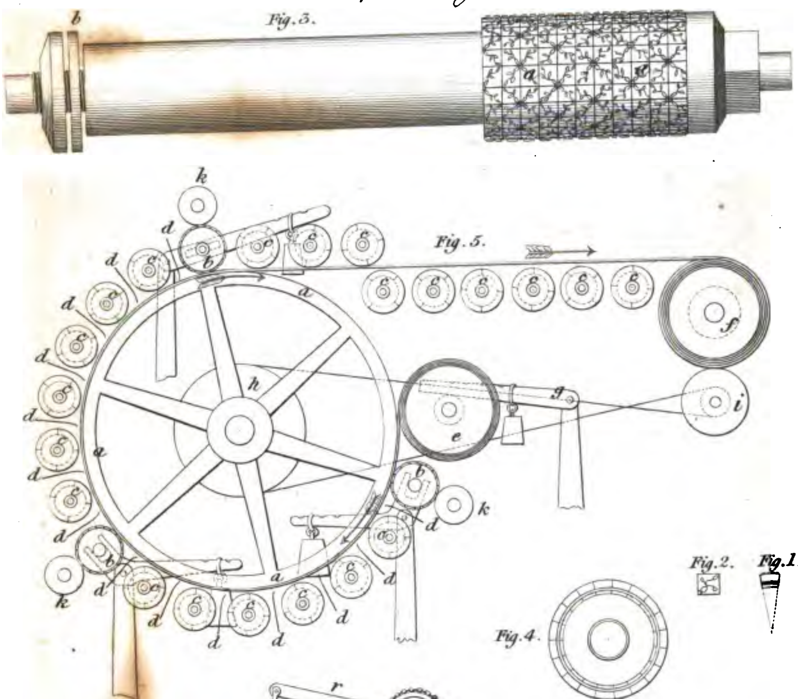
Rogers's Impd. Eye-let holes.

Fig. 11. Fig. 10. Fig. 9.

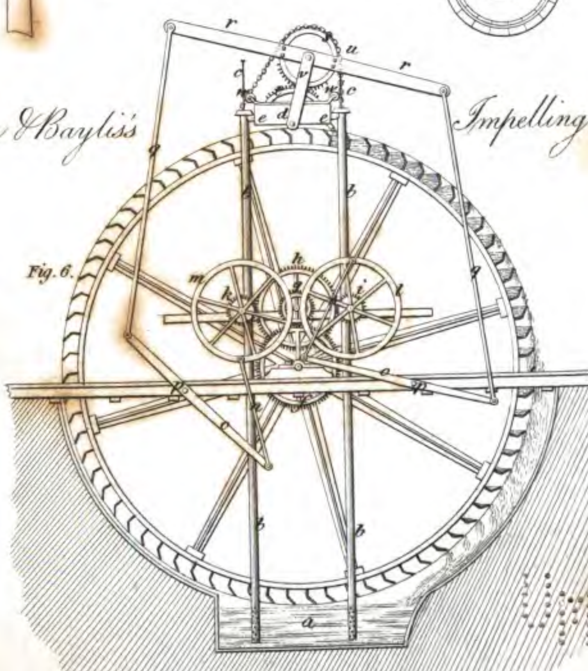


W. Newton del.t G. Gladwin sculp.t

Church's calico printing apparatus.



Harpur & Bayliss's Impelling Machinery.



W. Newton. del.

G. Gladwin. fc.

PLATE V. VOL VII.

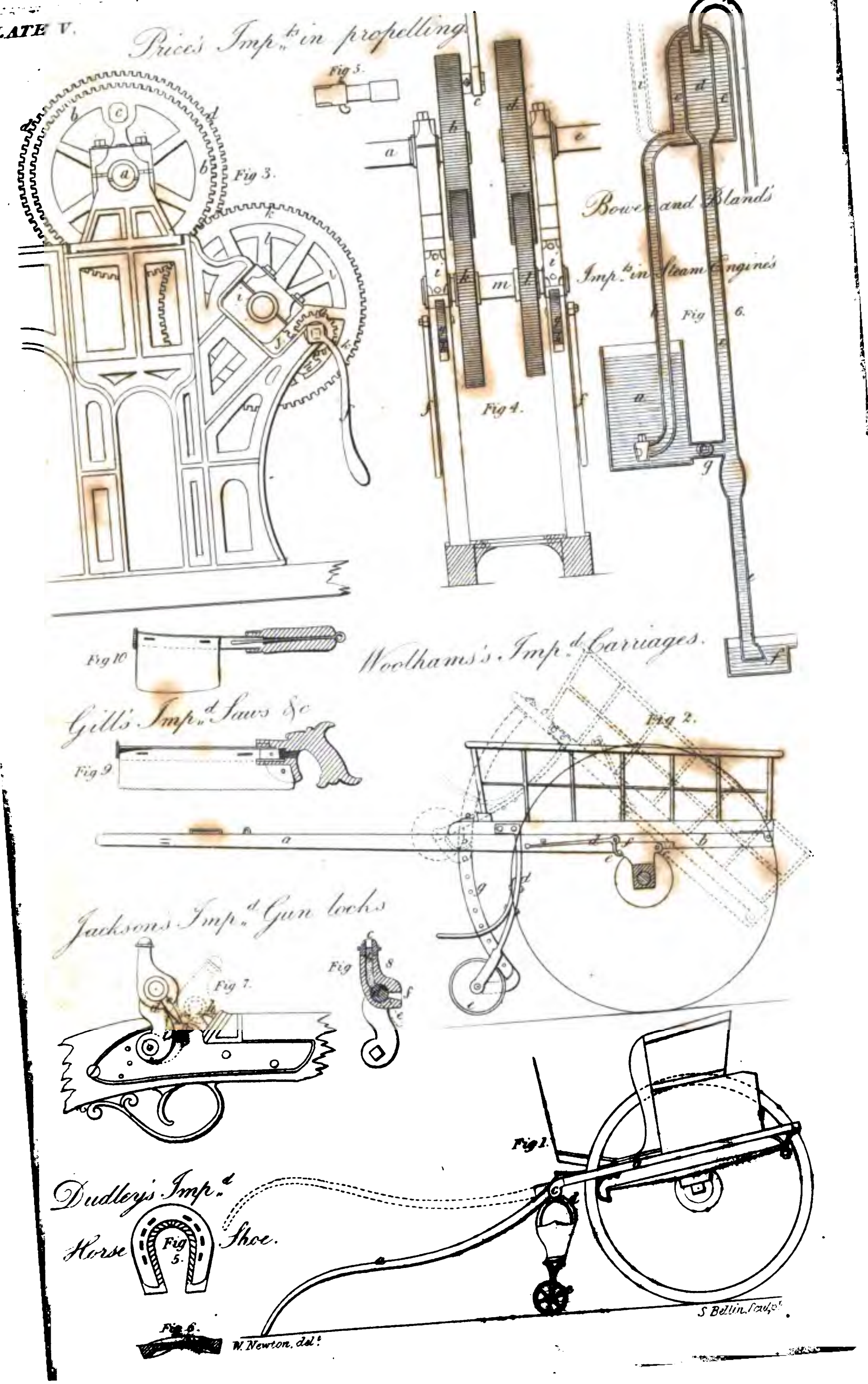
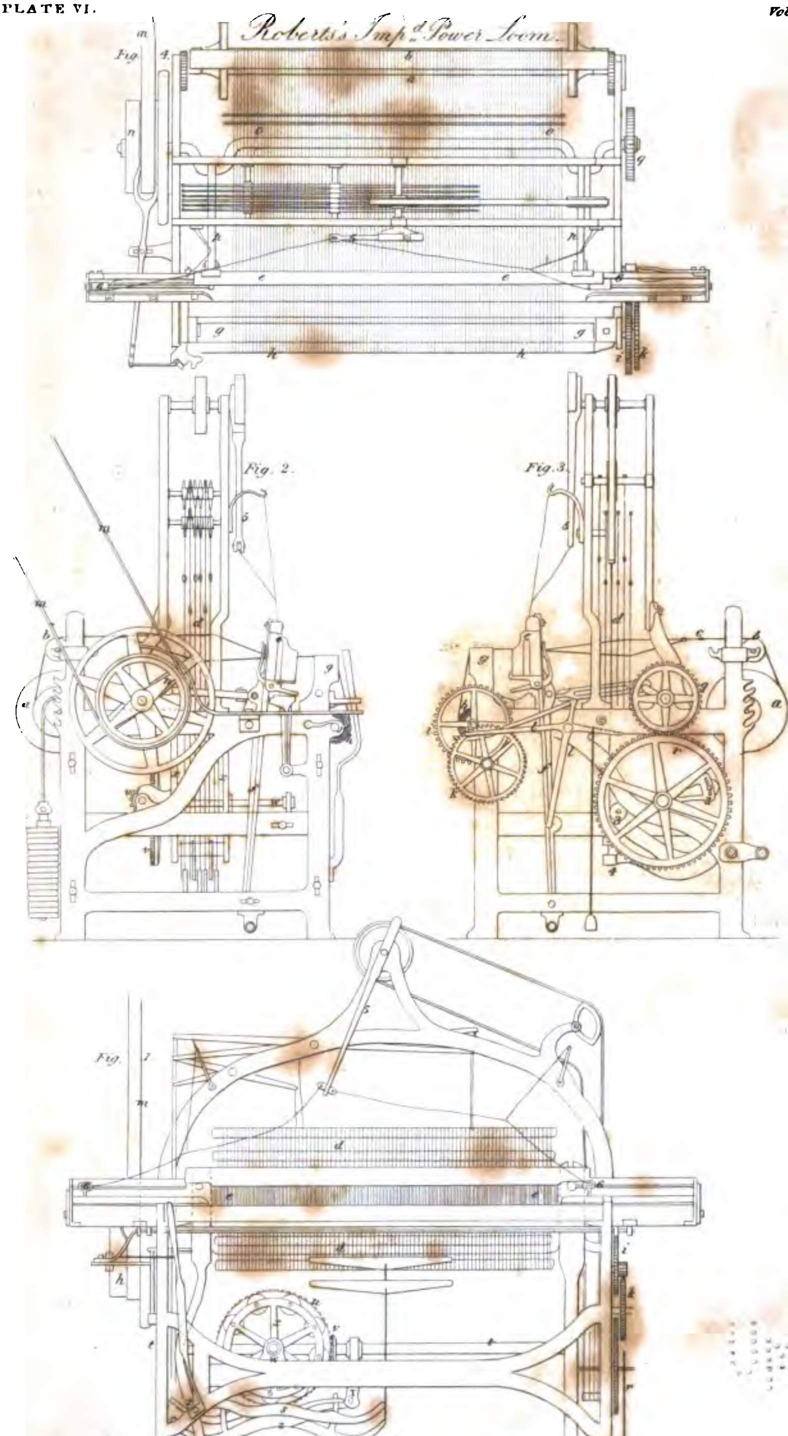
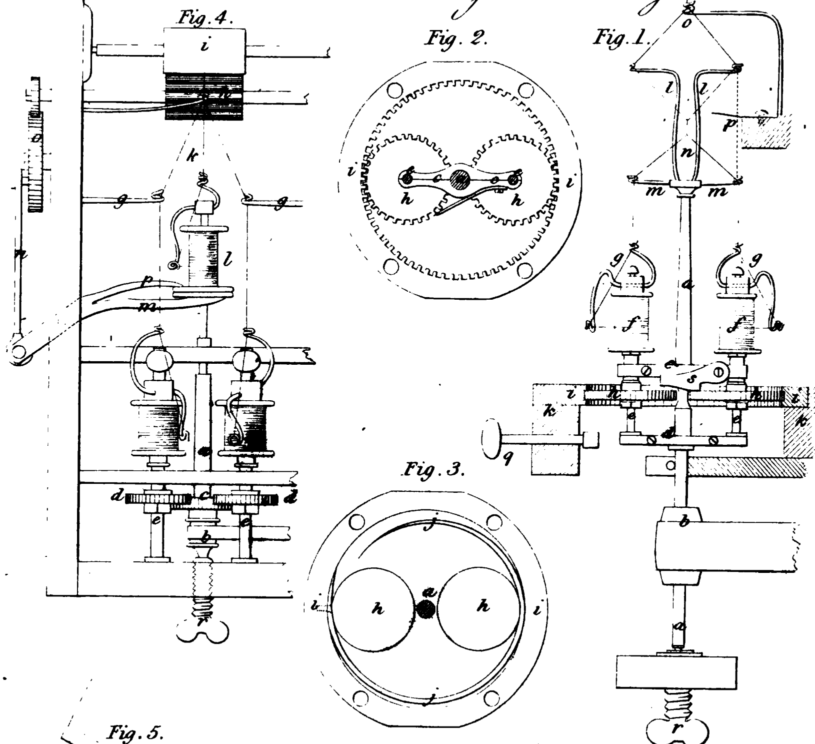


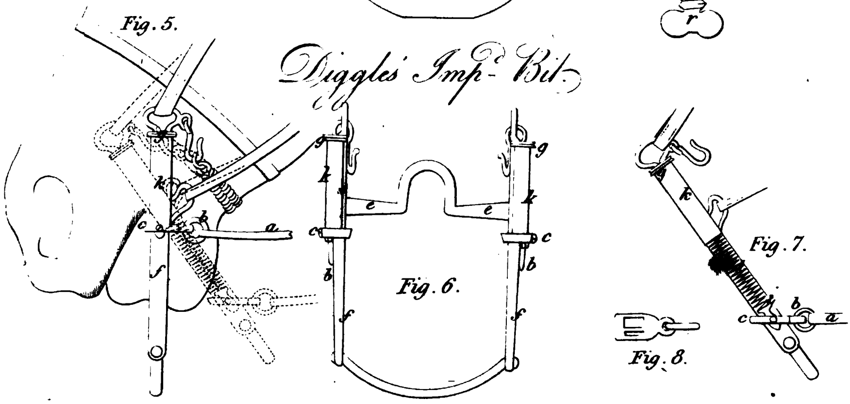
PLATE VI. Roberts's Imp.d Power Loom. Vol. VII.

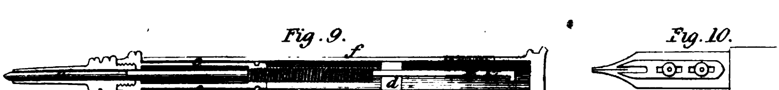


Badnall's Silk Throwing Machinery.



Diggles' Imp^d Bit.





Hawkins & Mordant's Pencilholder and Pen.

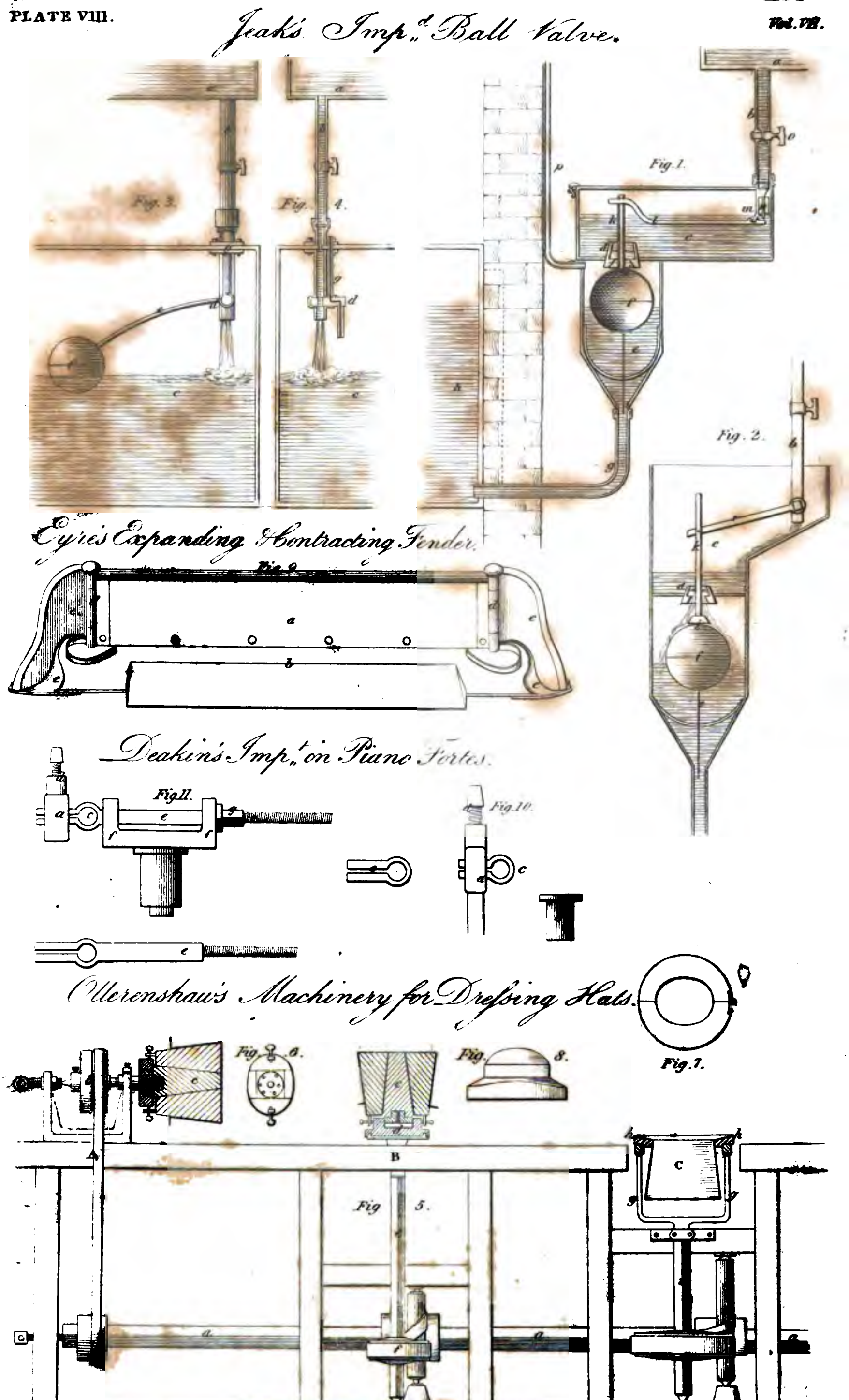
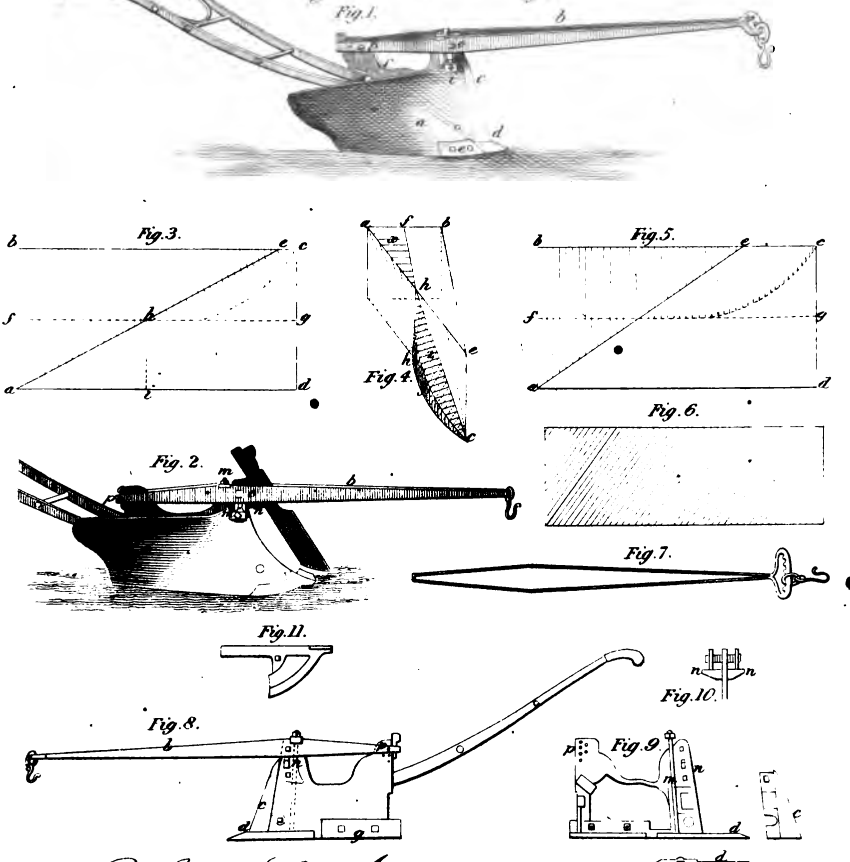
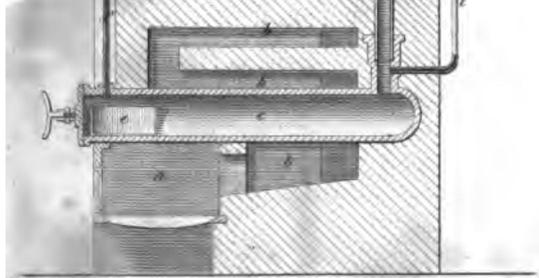


PLATE VIII.
Vol. VII.
Jeak's Imp.d Ball Valve.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Eyre's Expanding & Contracting Fender.
Fig. 9
Deakin's Imp.t on Piano Fortes.
Fig. 11.
Fig. 10.
Ollerenshaw's Machinery for Dressing Hats.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
W. Newton, del.

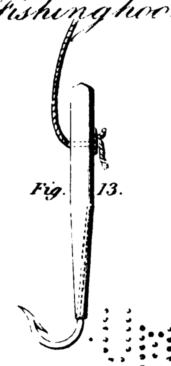
Clymers Ploughs

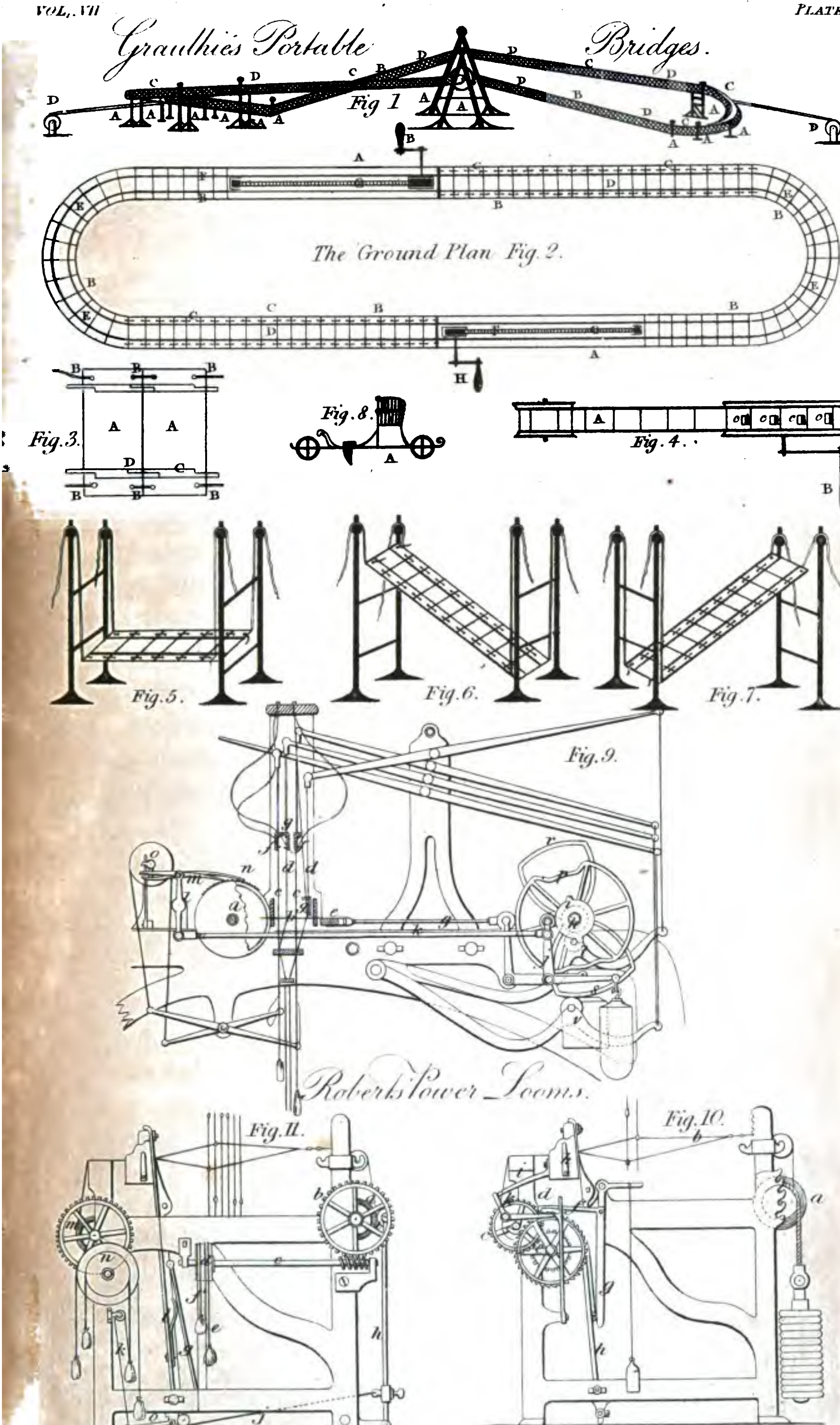


Vere & Crane's, Gas Apparatus



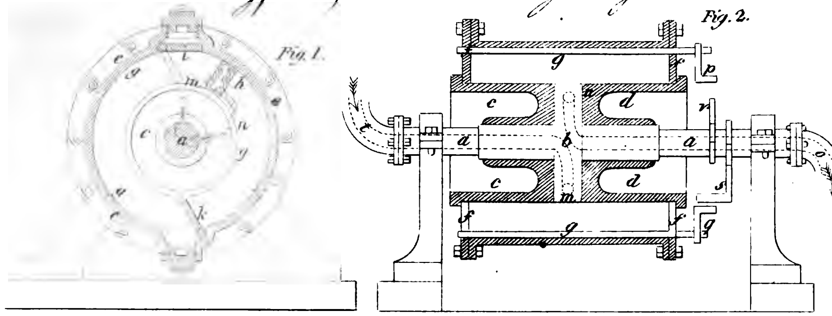
Coffins Fishinghook.



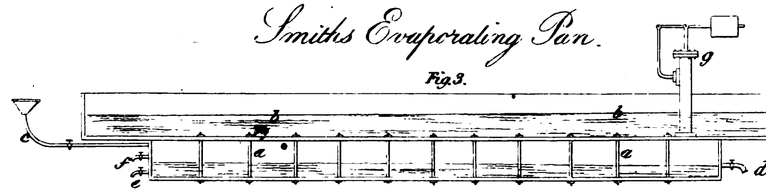


W. Newton del. S. Bellin sc.

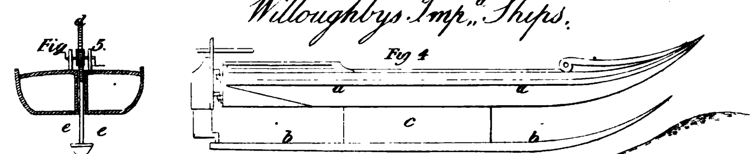
Beningfield & Beals Rotatory Engine.



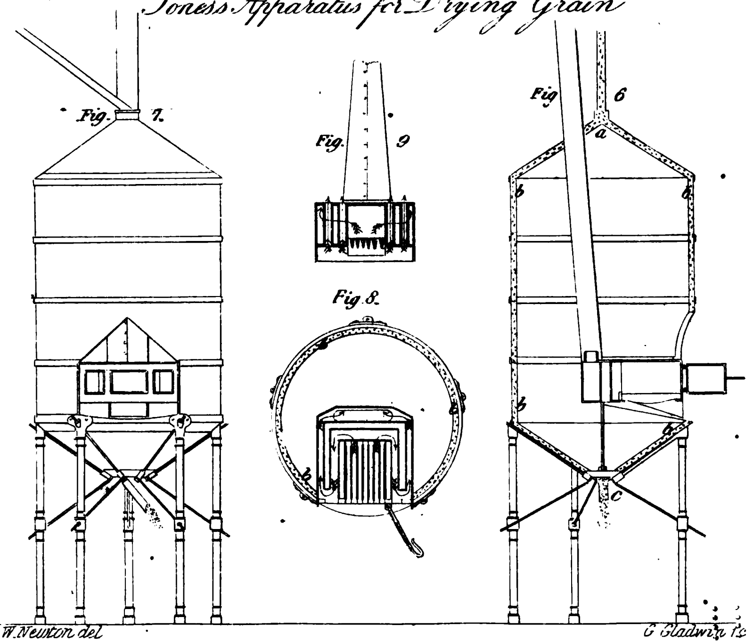
Smiths Evaporating Pan.



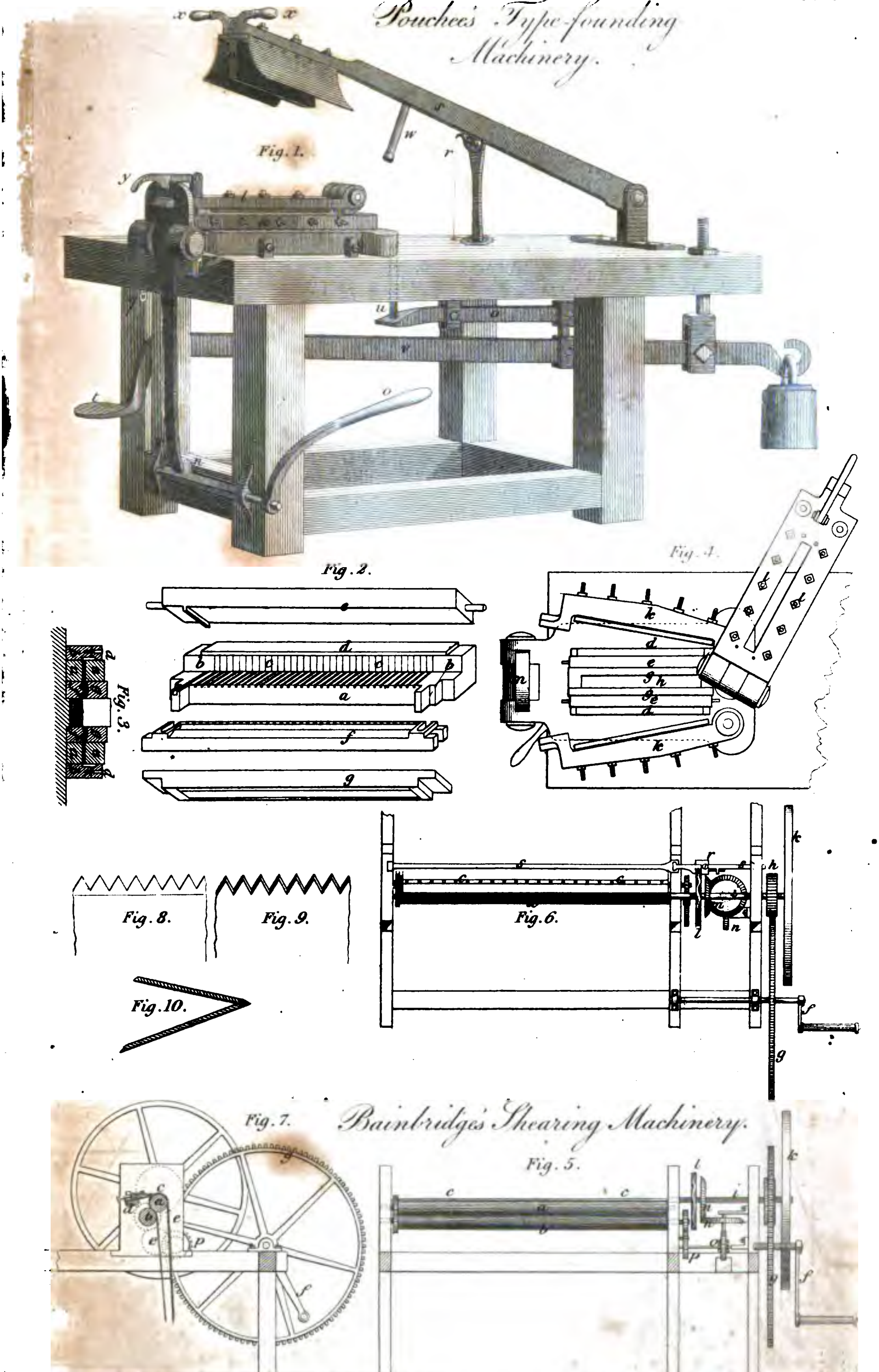
Willoughbys Impd. Ships.



Jones's Apparatus for Drying Grain



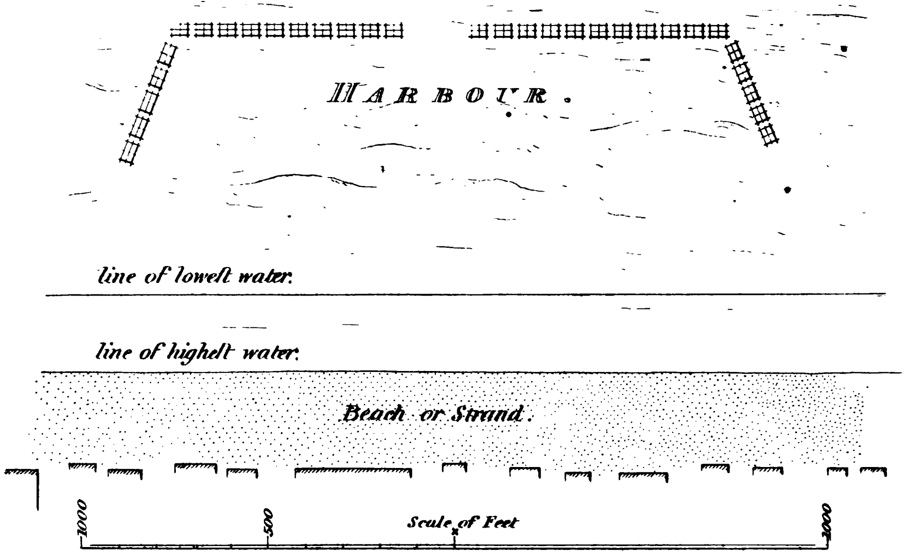
W. Newton del. G Gladwin Sc.


Pouchee's Type-founding Machinery.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 6.
Fig. 8.
Fig. 9.
Fig. 10.
Fig. 7.
Bainbridge's Shearing Machinery.
Fig. 5.

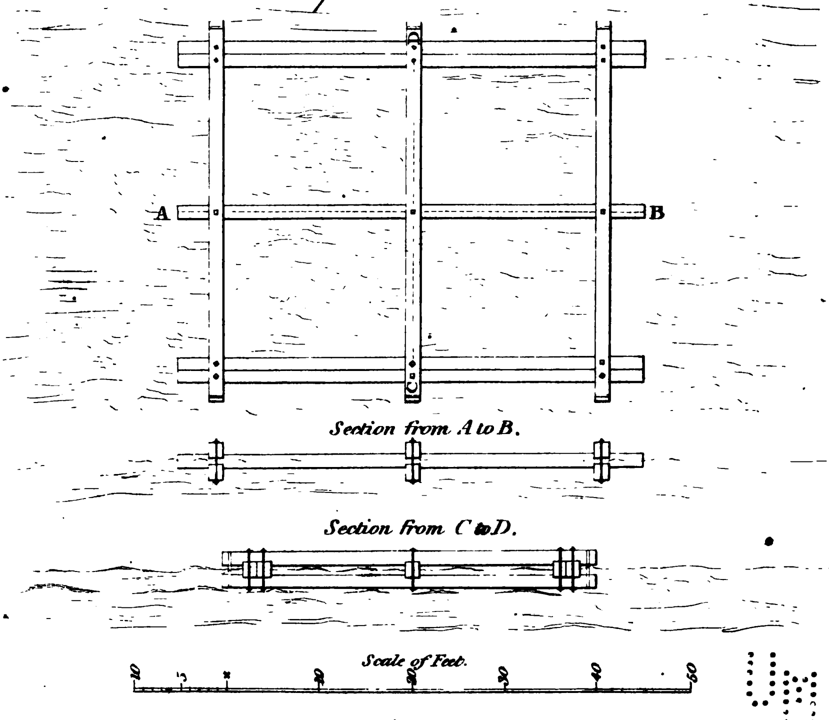
W. Newton del.

White's Patent Breakwater.

Plan of a Harbour to be created by a floating Breakwater.



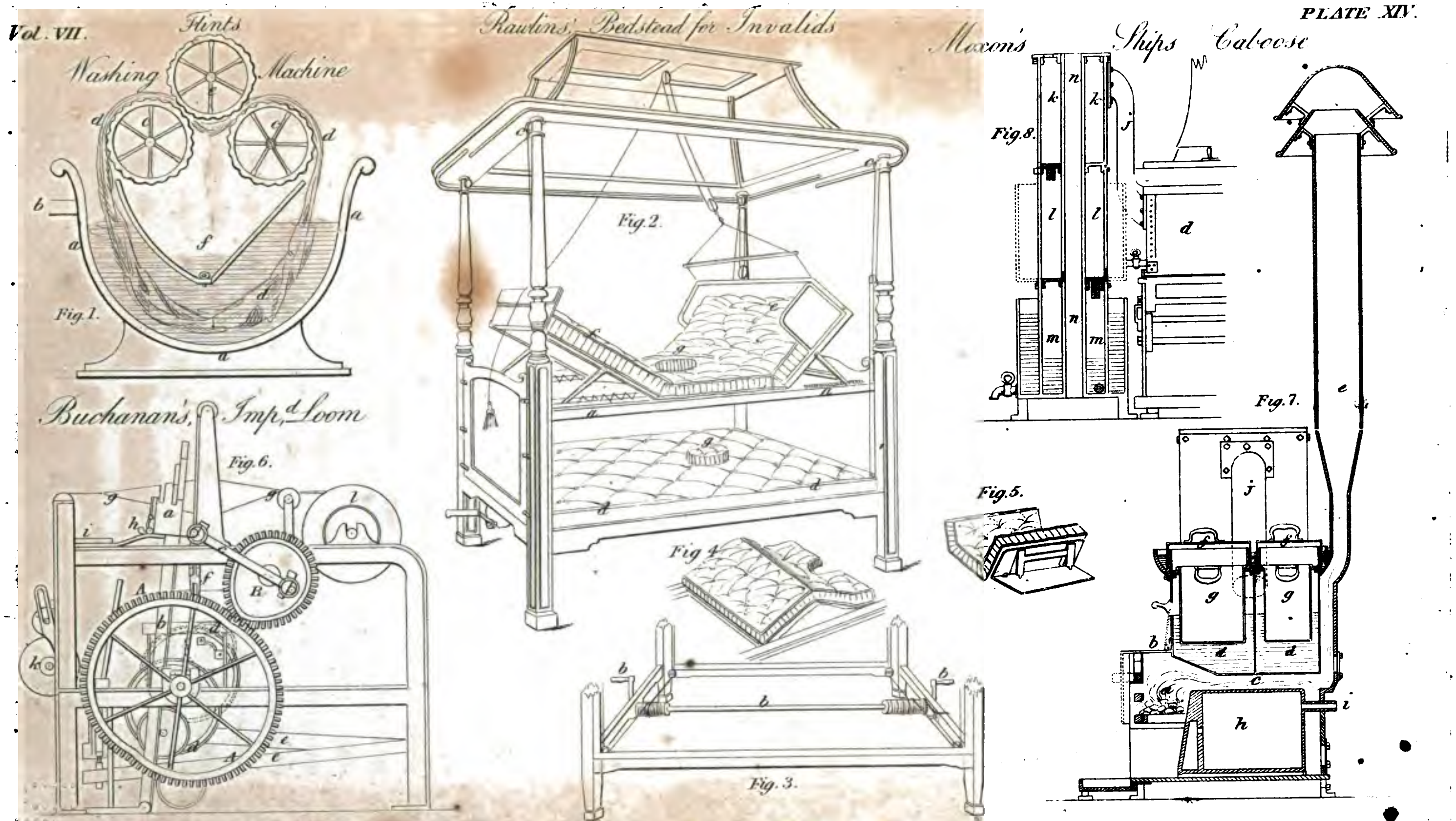
open Frame.



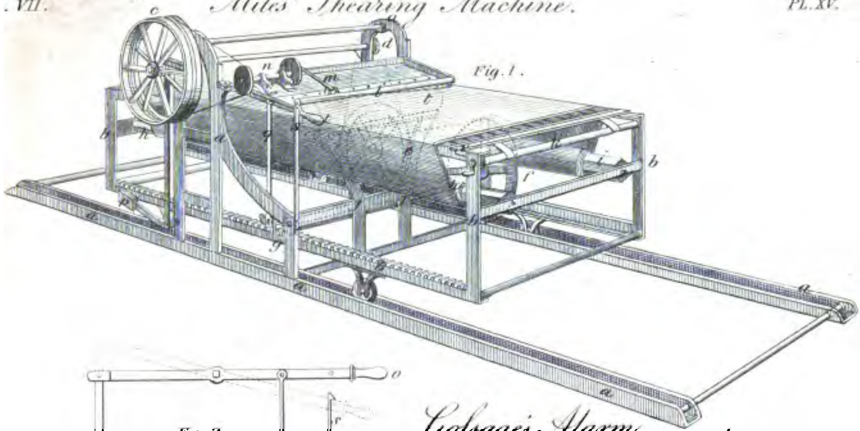
W Newton del.

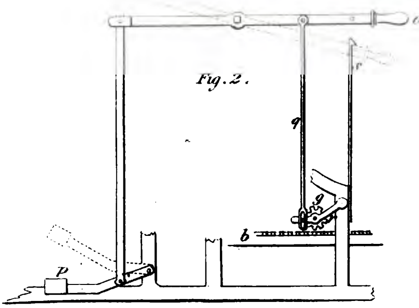
S.G.

Vol. VII. PLATE XIV.

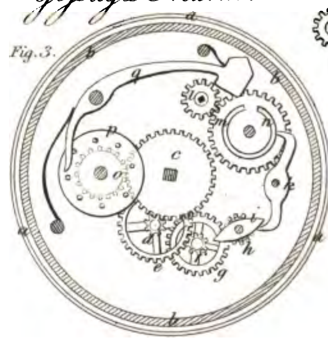


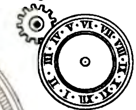
W. Newton, del. S. Bellin, Sc.



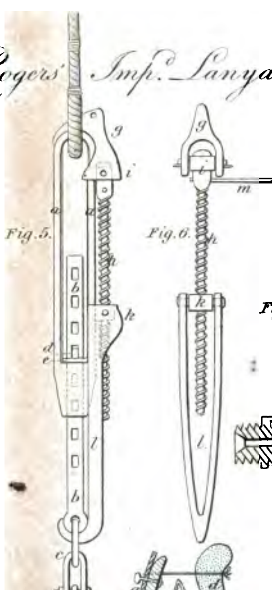


Gossage's Alarm.

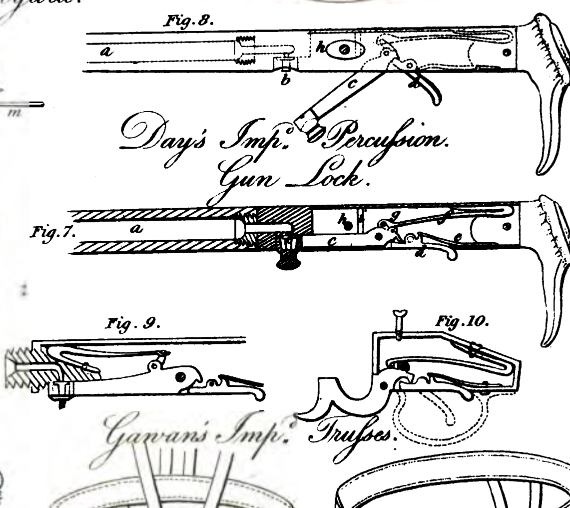


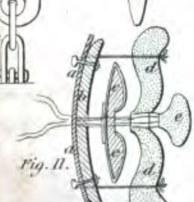


Rogers' Impd. Lanyard.

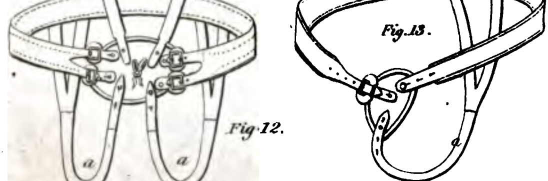


Day's Impd. Percussion Gun Lock.





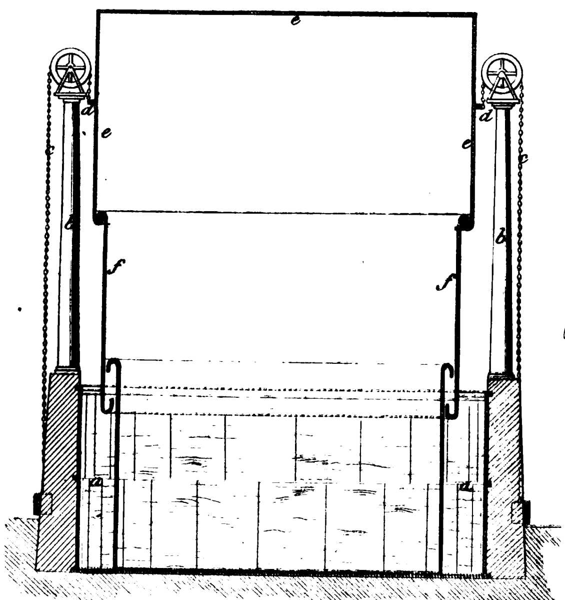
Gavan's Impd. Trusses.



W. Newton del.t S. Bellin sculp.t

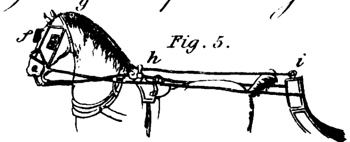
Tait's Gasometer.

Fig. 8.



Greaves' Impd. Harness

Fig. 5.



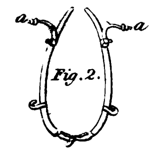


Fig. 2.

Fig. 6.

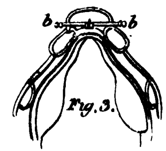


Fig. 3.

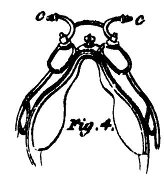


Fig. 4.

Luckcock on Light.

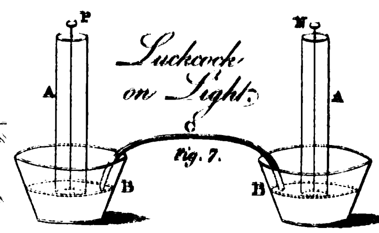
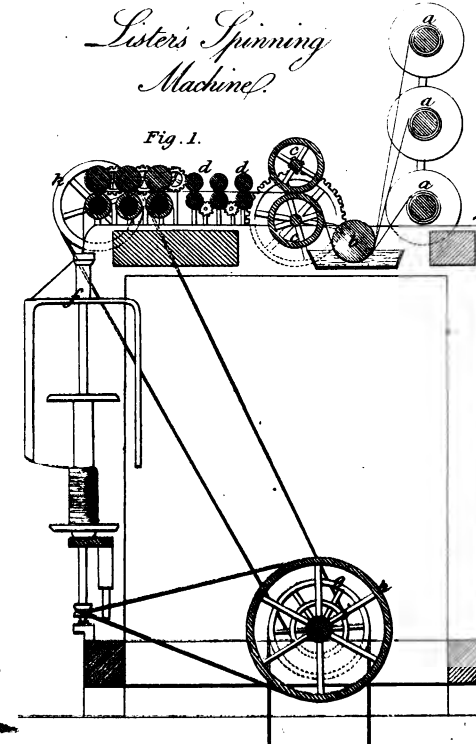


Fig. 7.

Lister's Spinning Machine.

Fig. 1.



W. Newton. delt.

G. Gladwin Sculpt.